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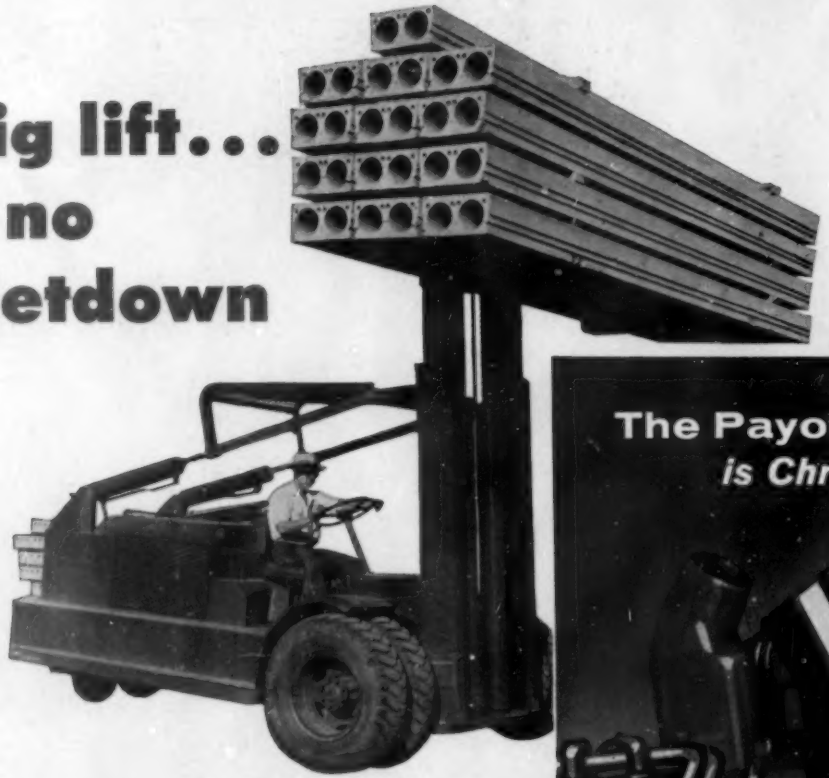
Cover Scene: Nello L. Teer believes in accurate spotting of trucks for fast loading (see page 53) . . . Proposal: prestressed concrete pavement without steel . . . Contractors' scraper loading practices reviewed . . . All electrically heated asphalt plant . . . Notes on Washo meeting.

August 1957

big lift... no letdown



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Erickson power lift trucks have a capacity up to 20,000 lbs.! To assure balanced weight distribution—with no letdown in efficiency—special ballast is shifted hydraulically from front to rear of the truck. To assure dependable, trouble-free power—with no letdown on the job—Erickson chooses Chrysler Industrial Engines.

CHRYSLER INDUSTRIAL 33, in-line 6 Engine (265 cu. in. displacement) powers the Erickson Power Lift Truck and many other makes of equipment in the construction and materials handling fields. There are four Chrysler in-line 6s, two V-8s—ranging from 230 to 354 cu. in. displacement.

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☐ For specific detailed information ☐ For descriptive literature

NAME

ADDRESS

CITY ZONE STATE

Steel Bridge Floor Gives New Life to Old Bridges

When the old flooring of the three bridges shown here needed replacing, the bridges were stripped to the stringers, repairs made and new decks of Bethlehem Formed Steel Bridge Flooring laid down. Result: strong, smooth, rattle-proof bridge floors, requiring little or no maintenance.

In each case, Bethlehem Formed Steel Bridge Floor was easy to install. First, the worn planking was removed, then the Bridge Flooring was carried from the stockpile, where it nested compactly in small piles, to the bridge. After proper positioning, the 2-ft-wide corrugated steel plates were welded to the stringers, and adjacent plates welded together. In the case of wooden stringers, the steel floor is easily attached with lag screws and washers.

After a surfacing material was applied, the new bridge floors met all strength specifications of the American Association of State Highway Officials' standard specifications for highway bridges.

For complete information on Bethlehem Formed Steel Bridge Flooring write or phone the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY
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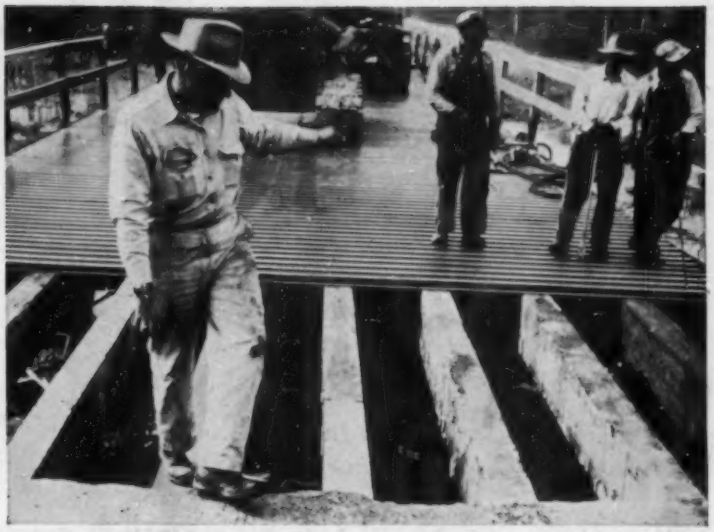

Steel bridge floor over the solid wood stringers of this rural Tennessee span resulted in a strong bridge.

The Bethlehem bridge floor over this bridge in Pennsylvania will require very little maintenance.

Applying the first surface course on a rural Connecticut bridge. A second wearing course is also applied.

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ROADS AND STREETS

A GILLETTE PUBLICATION • AUGUST, 1957 • VOLUME 100 • NUMBER 8

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Bridges and Structures
More reports on prestressing and precasting developments . . . Multiple form use for $5,300,000 Thruway bridge substructure . . . Notes on San Francisco world prestressing conference.

Embankment Design
Example of accelerated, controlled settlement by earth surcharge.

Excavation and Grading
Mountain blasted for fill material on western relocation project . . . other reports in continuing series on contractor rock excavation practices.

Accepted as Controlled Circulation Publication at Milwaukee, Wisconsin. Published monthly. Subscription $5.00 per year.

"LARGEST FILL IN OHIO" is how C. F. REPLOGLE Construction Co., Circleville, Ohio, describes the 97-footer on its U.S. Route 40 relocation job. Other cuts and fills run between 80 and 90 feet – and up to 70% of the material is broken limestone and sandstone. This is tough on tires–but Goodyear Triple-Tough 3-T Nylon Cord TUBELESS tires take it even better than tube-type, cut earth-mover tire down time to new LOWS. Tubeless tires shown at work are (left to right) new wide-base Sure-Grip Lug, wide-base Hard Rock Lug and standard All-Weather.

Up to 80% cut in earth-mover tire down time—

plus many other advantages!

Goodyear TUBELESS tires end tube and flap troubles—causes of as much as 80% of earth-mover tire down time. They also end costs of tube replacement and many-item inventories.

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AND you save tires—for with Goodyear TUBELESS, small injuries usually show *before* they get serious.

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ON-JOB SERVICE BOON TO CONTRACTORS. Priceless time and valuable tires are saved by this fast and expert service. Strategically located Goodyear shops and field crews are convenient to jobs almost anywhere.

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SURE-GRIP LUG

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Speed up construction . . .

USE SONOCO SONOTUBE® FIBRE FORMS

for round concrete bridge piers!

Overpass for side roads, New Hampshire Turnpike, Dover, N. H., State of N. H., owner. Landers and Griffin, contractors. Hayden, Harding & Buchanan, engineers. Photo by Zambello.

Low-cost, quick to erect
Sonoco SONOTUBE® Fibre Forms
save time!

Both 36 and 30 inch Sonoco SONOTUBE® Fibre Forms were used to construct the round concrete piers of this highway overpass bridge. Forming for caps tie-in simply with the fibre forms of the supporting piers.

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Speed up construction time . . . save money and labor . . . use Sonoco SONOTUBE® Fibre Forms to erect round columns of concrete! Order Sonoco Fibre Forms for your next job . . . sizes from 2" to 48" I.D. up to 48' long. Supplied in specific lengths or can be sawed to size on the job. For finished columns use Sonoco's patented "A-coated" SONOTUBE® . . . wax-coated also available.

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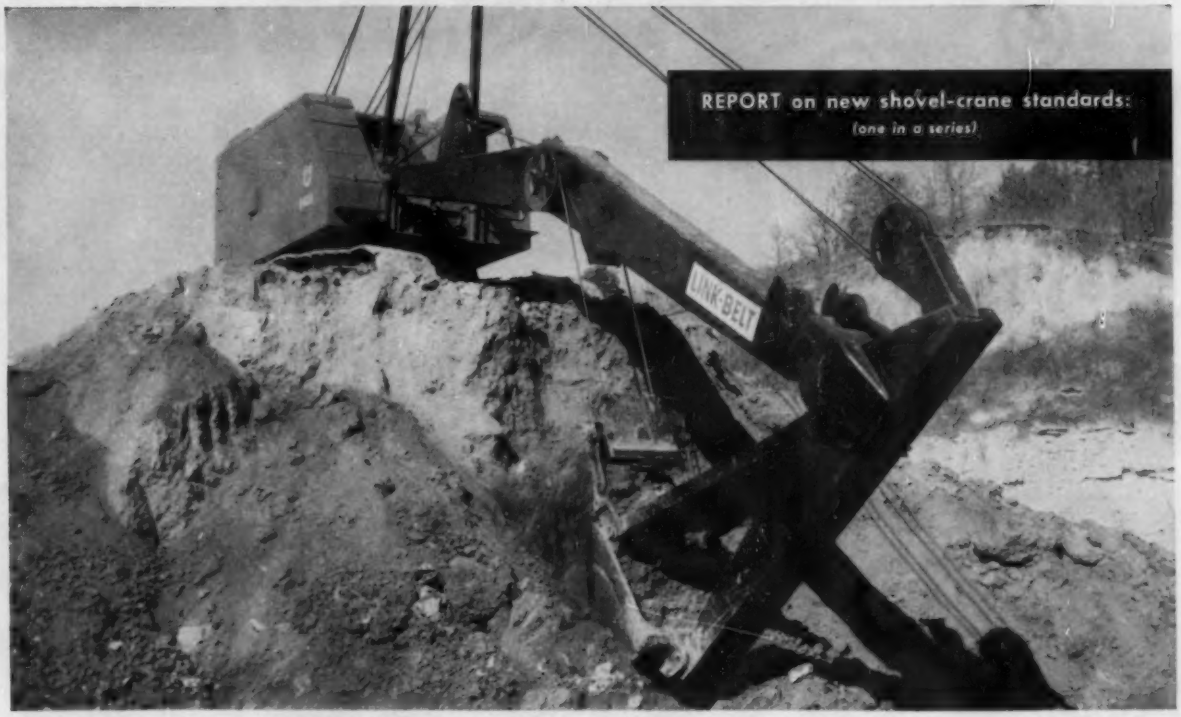

Now from Link-Belt Speeder—a

new, high-speed 3-yd. hoe

Answers the need for an agile, mobile...more powerful, deeper digging...big-capacity hoe

Here's the largest production-model hoe in the industry! It's the same proven design as the highly successful K-608 shovel and dragline now available with a new 3-yd. hoe attachment. The hoe attachment has 30-ft. boom (maximum reach of 51½ ft.), and will dig to a depth of 31 ft., 10 in. Cutting width, with side cutters, is 5 ft.

Featuring a matched engine-torque converter package with output-shaft governor, the K-608 delivers power that is automatically and constantly matched to the load. Results—faster cycles, greater fuel economy, elimination of engine stallouts due to load.

Other features of this quality and precision-built hoe include bonus *usable* horsepower, hydraulic power steering, and hydraulic-actuated clutches that automatically compensate for heat and normal lining wear.

For comprehensive details, call your Link-Belt Speeder distributor or write: LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA.

FAST, NON-FATIGUING, POSITIVE CONTROL — Like all Link-Belt Speeder models, the K-608 features power hydraulic controls as standard equipment. A flip of a short-throw lever puts the K-608 through its paces. Response is fast, positive, smooth. Operator fatigue is practically eliminated.

14.681

It's time to compare...with

LINK-BELT SPEEDER

Builders of a complete line of shovel-cranes . . . with exclusive Speed-o-Matic power hydraulic controls

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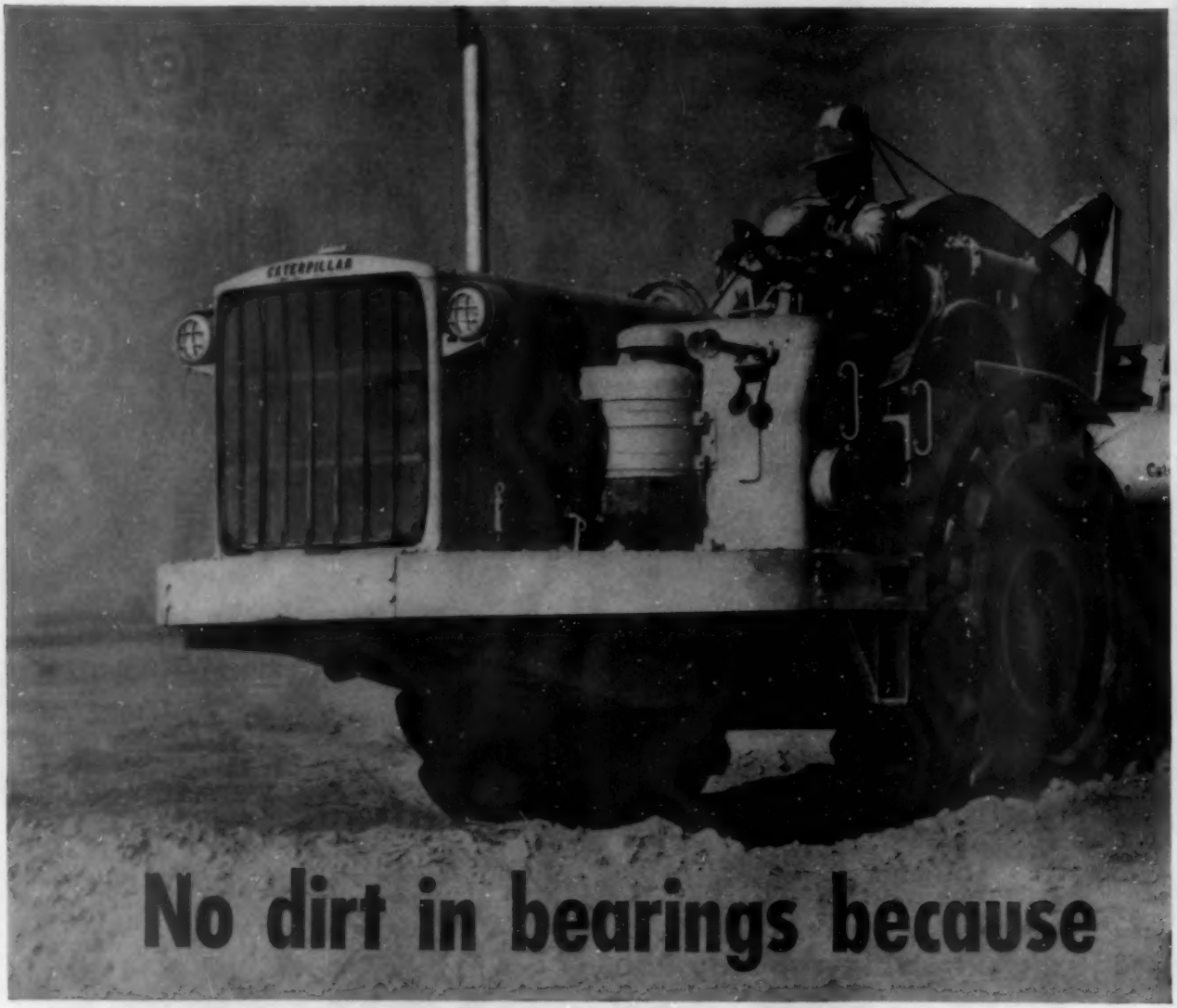

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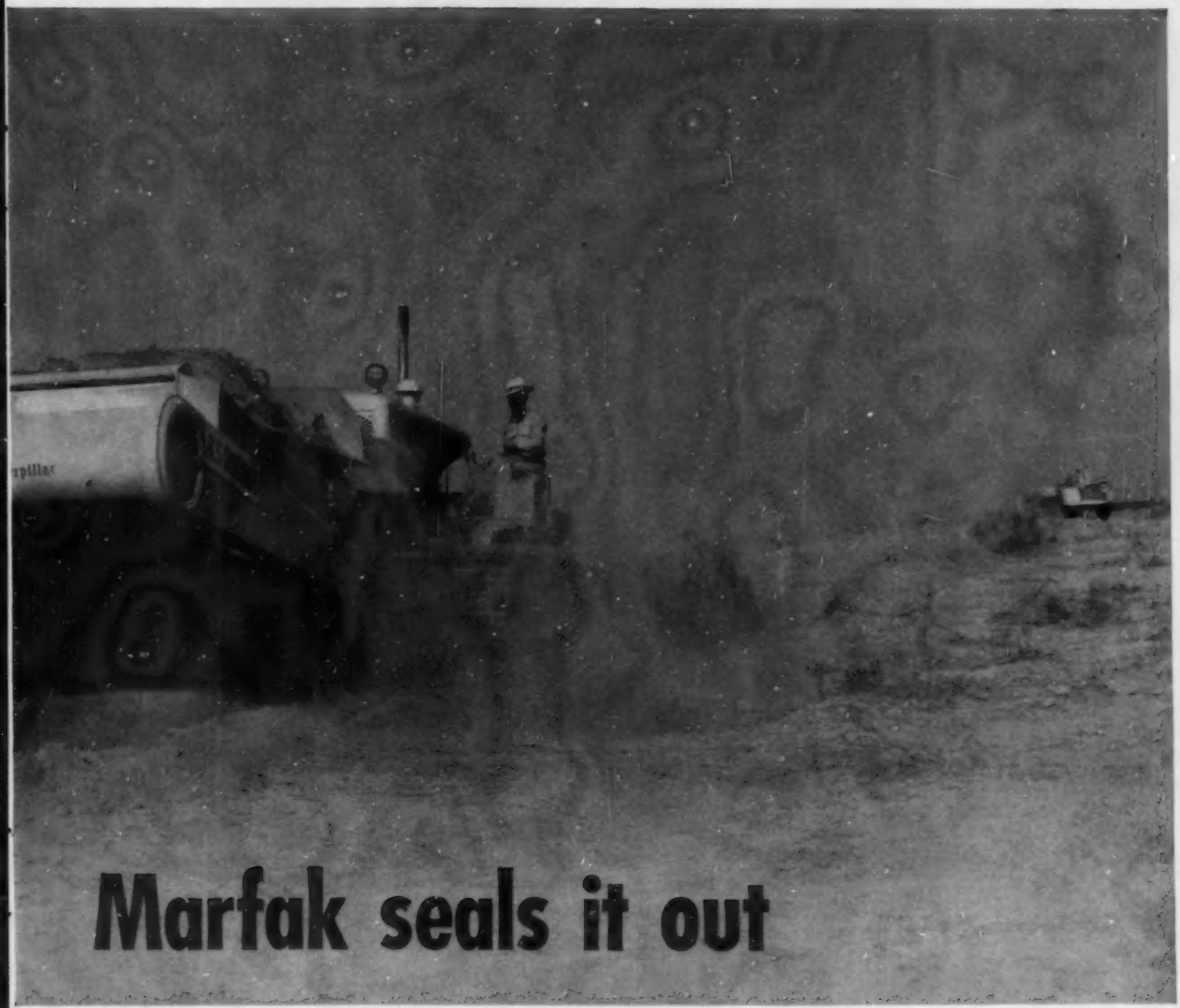
The most effective way to keep abrasive dirt out of your wheel bearings is to use *Texaco Marfak Heavy Duty 2*. It is designed specifically for wheel bearings and actually seals itself in, and stays in, through the heaviest service and highest temperatures. It gives you longer bearing life, and extra thousands of miles between repackings.

For chassis lubrication, *Texaco Marfak* has the same "sealing in" action. It keeps out dirt and moisture to give top protection against wear and rust. And it won't jar out, pound out, or squeeze out. In fact, *Texaco Marfak* has proven so successful that *over 650,000,000 pounds of it have been sold!*

If you prefer an all-purpose lubricant, your choice would be *Texaco Marfak Heavy Duty*

TEXACO



Marfak seals it out

Special 2. It pumps easily and handles all grease lubrication regardless of temperature.

To get the same effective protection for crawler mechanisms, use *Texaco Track Roll Lubricant*. For differentials, specify *Texaco Universal Gear Lubricant EP*.

Ask a Texaco Lubrication Engineer to do these two things for you: (1) give you details on how Texaco lubricants can help you, and (2) work out a Texaco Simplified Lubrication Plan for your job—it lets you handle all major lubrication with no more than 6 Texaco products. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT

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- ☐ TECHNICAL REPORT NO. 4 . . . Hydrostatic Pressure Tests on DURAJOINT and other Waterstops.
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- ☐ Have representative call.

DEPT. 28

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Headlines

Bid Prices Are Up—But Ranging Widely in States

Bid prices for federal-aid highway construction were 7.7% higher in the first quarter of 1957 than the first quarter of 1956, the Bureau of Public Roads has reported.

Among the 48 states, however, prices swooped from substantially below the average to considerably above it. A *Roads and Streets* survey of selected states revealed anything but a uniform pattern. State examples:

- South Dakota—up less than 1%
- Wisconsin—up 1.5%
- Pennsylvania—up 2.7%
- Texas—up 6%
- Colorado—up 7%
- Maryland—up 12%
- Iowa—up 5% to 20% on major items
- Illinois—up 17% (largely because of longer haul distances, higher proportion of more difficult work)
- Washington—up 21%
- California—up 26% (influenced significantly by two large projects with unusually difficult working conditions. Without these two jobs, the index reveals an increase of 13%)
- Virginia—up 53% (partially because cubic yard bid prices for excavation are more than doubled)

$23 Million Contract Let for Illinois Toll Project

The largest single construction contract ever let by the state of Illinois has been awarded as a part of the program of putting the $300 million Illinois toll road program on the books. Amounting to $23,400,765, the job calls for building the 7.6 miles of the Tri-State route extending approximately along the Cook county line, north and south, in the suburbs west of Chicago.

The joint bid was made by S. A. Healy Co. and M. J. Boyle & Co., both of Chicago; Western Contracting Corporation, Sioux City, Ia.; and Ryan Construction Co., Inc., Evansville, Ind.

All but two miles of the 187-mile toll highway has been awarded as of June 5, according to the Illinois Toll Road commission. Target date for completion of the road is the 1958 year-end.

CONTRACTORS are strong for GALION ROLLERS
J. R. FORD COMPANY HAS 28 OF THEM!

J. R. FORD CO., INC.
GENERAL CONTRACTORS AND ENGINEERS
LYNCHBURG, VIRGINIA

October 8, 1956

The Galion Iron Works & Mfg. Company
Galion, Ohio

Gentlemen:

We are glad to give you permission to use the picture of the Galion roller.

We like the Galion roller very much, and we have 28 of them - 7 three wheel, one trench roller, and 21 tandems.

Galion rollers are simple, easy to keep up, and we have been very fortunate in dealing with a dealer who carried a full line of parts and whose service was unparalleled if and when service was needed which was on rare occasions.

Yours very truly,

J. R. FORD COMPANY, INC.

Jesse R. Ford

Jesse R. Ford,
President

JRFinf

Galion rollers are simple, easy to keep up, and we have been very fortunate in dealing with a dealer who carried a full line of parts and whose service was unparalleled if and when service was needed which was on rare occasions.

You need GALION Roller performance to meet the stiff specifications, keep work on schedule, and make a good profit on those big jobs on the mammoth National Highway Project. Modernize your roller fleet by standardizing on the BEST — Galion ROLL-O-MATIC Tandem and Three-Wheel Rollers.

See your Galion Distributor without delay or write today for complete information.

ESTABLISHED GALION 1907

GALION 1907 50th ANNIVERSARY

MOTOR GRADERS · ROLLERS

TRENCH ROLLERS · PORTABLE ROLLERS · 3-WHEEL ROLLERS · TANDEM ROLLERS · MOTOR GRADERS

THE GALION IRON WORKS & MFG. CO., General and Export Offices, Galion, Ohio, U.S.A.
Cable address: GALIONIRON, Galion, Ohio

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From coast to coast thrift-minded owners report:

"Climbing the 1,200-foot ramp that rises 100 feet from pit to primary crusher, our '95' Payhauler averages a 22-ton load of shot granite every 8 to 10 minutes," reports Supt. H. C. Burgess, for Superior Stone Co., Woodleaf, North Carolina. "Production of this hauler unit is 1,000 tons per 7 hours." And the "95's" turbocharged diesel burns only 4½ gallons of low-cost fuel per hour on this tough quarry job!

"Grade-beating, rock-speeding Payhauler® gives us the decisive profit margin of difference!"

"The fast reverse of the '95' Payhauler is a big advantage on narrow, one-way haul roads—enabling our two units to keep the big shovel busy," states Howard Durbin, for Durbin Brothers, Eugene, Oregon. "Our other haulers with slow back-up could not do this."

"Down switch-back grades as steep as 30%, the '65' Payhauler takes its loads—then climbs back out at fast speeds," declares Supt. Howard Eaton, for Funderburk Construction Co., Sutherlin, Oregon. "The best of the other haulers of this size just can't keep going on our tough Roberts Mountain haul road, like the '65' can!"

"Two '95' Payhauler trucks (24-ton capacity) replaced three 15-ton competitive haulers, and handle the operation with ease," says Supt. Henderson Hawkins, Stone Mountain Grit Co., Lithonia, Ga. "With unusually fast hoist, good balance, and speedier delivery, the '95's' reduce spotting and dumping time, also save 20% on fuel."

On tough St. Lawrence Seaway—for United Waterways Constructors—11 '95' Payhauler trucks are sparking a demanding monthly production schedule of 120,000 cu yd of rock, and 100,000 cu yd of common earth. *Next-to-automatic* Payhauler control gives safe, capacity-adding speed over rough terrain!

At 7,600 feet altitude, a fleet of 4 turbocharged diesel-powered "95" Payhauler units help Morrison, Walsh & Perrini highball rock-fill to build Wishon Dam—in Sierra National Forest, California. All 4 operators vote superior riding comfort, torqmatic braking safety, hand-operated dumping brake, as stand-out '95' advantages!

"Engine power matches hauler capacity, to pull a 20-22 ton load from the quarry in second gear, over haul-road grades as steep as 15%," reports J. L. Sutherland, '65' Payhauler operator for Jefferson County Stone Company, Anchorage, Kentucky. "The Payhauler rides good, has excellent visibility, and maneuverability, shifts easy."

Prove an International Payhauler's production-boosting speed! The "95" is turbocharged diesel-powered to highball at 38 mph—the "65" at 36.4 mph! Try the "pick-up truck" spotting ease—using exclusive high reverse and "zip-around" power steering to position the "big-target" body, double-quick. Compare how the double-acting hydraulic hoist, under exclusive hand-brake control, gives 10-to-12-second dumping. Measure the big profit-building margin of difference—see your International Construction Equipment distributor for a Payhauler demonstration!

Satisfaction with two Payhauler trucks on one successful rock-moving contract prompted Clarkson Construction Co., Kansas City, Mo., to add three more "95's" to their fleet—to help handle a new, bigger contract. "Best production I've ever had," says Project Superintendent H. D. Brown.

"Our three '65' Payhauler trucks move up to 2,000 cu yd of shot rock per 10 hours on a 1,200-foot delivery haul," states Warren Greer, for Greer Brothers and Young, London, Kentucky. The contractor is using these trucks to move 165,000 cu yd of shot rock relocating a section of U. S. 27 in Lincoln County, Ky.

INTERNATIONAL®
CONSTRUCTION
EQUIPMENT

International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.

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Compact low and narrow

155 Trenchliner® digs 10 FEET DEEP

Look at the low profile of this small 155 Parsons Trenchliner! Working height is only 7 feet-4 inches. This lets it dig under trees, overhanging branches and other overhead obstructions where larger trenchers can't go. Width over crawlers is only 5 feet-4 inches for work and travel between buildings, in narrow alleys, and other restricted operating areas. Close side-clearance puts trench within 21 inches of walls, poles, fences. Spoil conveyor dodges side obstructions without swerving from grade-line — shifts through machine by power in less than 1 minute. Belt direction is instantly reversible, places spoil bank on either side of trench.

For all its compactness, this utility-size 155 offers a big "plus" in work capacity. It digs 16 to 26 inches wide — 10 feet deep. You get 30 digging speeds (60 optional) from 5.8 inches up to 25 lineal feet per minute. Low range lets the 155 "inch" its way past cross-pipes, through rock and other underground obstructions. High range gives maximum feet per minute on cross-country trenching.

Sloping ladder-boom undercuts walks, curbs, gutters, makes vertical set-ins flush with main lines or foundation walls. Positive down-crowd with hydraulic control starts cut fast, maintains accurate grade. In fact, this 155 has all the heavy-duty characteristics of larger Parsons Trenchliners. It has cast-steel buckets, "Tap-In" teeth, spring-cushioned bucket-cleaner, enclosed gearing, tractor-type crawlers with 16-inch grouser treads or 12-inch flat shoes, choice of gas or diesel power. Have your Parsons distributor demonstrate what this new 155 Trenchliner can do for you — call him today.

Want more facts? *Send for* ☐ *spec. sheet* ☐ *bulletin on 155 Trenchliner*

NAME_____ TITLE_____

COMPANY_____ DIV._____

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PARSONS DIVISION

NEWTON, IOWA

KOEHRING COMPANY

CP633REV 25

MOBILE 88

Parsons rubber-tired 88 Trenchmobile® drives job to job under its own power at 12.6 m.p.h. — maintains fast schedules. Digs 14½ feet of trench per minute, 8 to 16 inches wide; depths to 5 feet.

Heavy-duty 250

This general-purpose 250 Trenchliner produces up to 9¾ lineal feet of clean-cut trench per minute. Widths, 16 to 42 inches. Depths to 12½ feet. Discharges well beyond edge of trench, or loads trucks.

BIG 310

Equipped with single digging boom, Parsons 310 Trenchliner excavates 17 feet deep, 1½ to 4½ feet wide. With dual booms, it digs 6 feet wide, 12 feet deep — speeds installation of largest sewers, mains, transmission systems, footings. Parsons wheel-types also available, including "big-inch" and "middle-inch" Trenchliners.

Get 3-tool versatility with Kwik-Mix Moto-Bug®

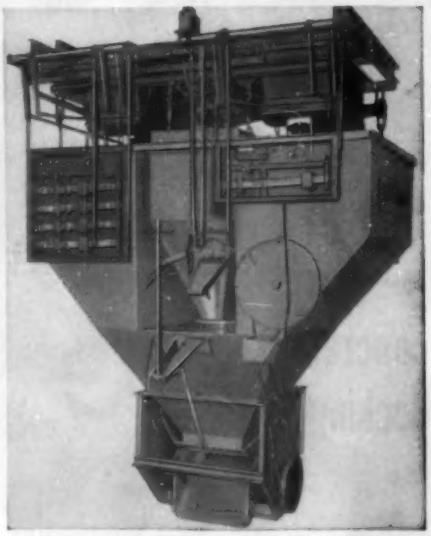
Big R-15 Moto-Bug hauls all kinds of bulk materials in 15 or 18-cubic foot hopper body. Hopper is quickly interchanged wtih 1-ton capacity platform, or ¾-ton (7-foot) fork lift. There's no limit to its usefulness — earns big savings in time and costs. Ask, too, about smaller S-10 Moto-Bug, available with multiple attachments. Kwik-Mix line also includes concrete mixers, plaster-mortar mixers, bituminous mixers — all sizes and types.

KWIK-MIX · Port Washington, Wis.
(Koehring Subsidiary)

Central cement feed prevents "gumming"

With concentric arrangement of aggregates around cement in the Johnson Concentric Batcher, all ingredients are intermingled as they flow through discharge. Reduces dusting, pre-shrinks materials. Cement is weighed individually on precision-beam scale; aggregates on accumulative dial scale or individual beam scales. Johnson Concentric Batcher sizes: 2 to 8 cu. yds., arranged for 2 to 8 aggregates, 1 to 4 types of cement.

C. S. JOHNSON · Champaign, Ill.
(Koehring Subsidiary)



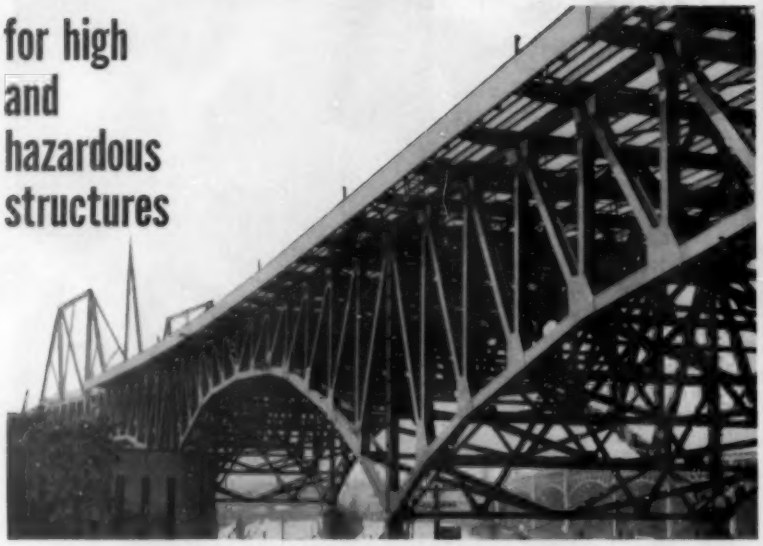
Compare Koehring 205 with any other ½-yard

Crowd, swing, boom-hoist and retract clutches on Koehring heavy-duty 205 are among the largest used in the ½-yard class. Powerful cable crowd and electric push-button dipper trip maintain fast dig-and-dump cycles. Automatic traction brakes simplify operation, lock and hold the 205 when working or parked. *Work capacity:* ½-yd. shovel or hoe; ½ to ¾-yd. clamshell or dragline; 10-ton lift crane on crawlers; 15-ton truck crane.

KOEHRING Company
Milwaukee 16, Wis.

. . . for more details circle 310 on enclosed return postal card

for high and hazardous structures

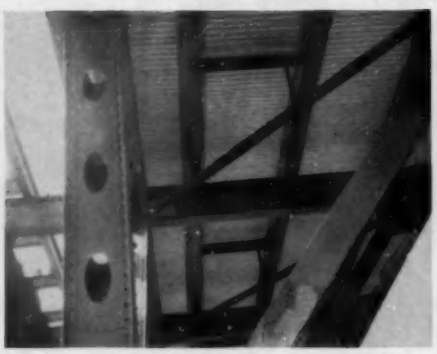


Leave-in-Place

Steel Forms

for

concrete bridge decking



USF galvanized Steel Forms provide the industry's most practical solution for laying concrete bridge decking where removal of conventional forms would involve hazardous and expensive operations. All installation is completed from top side without special tools or equipment. They are *left in place* after concrete is poured, eliminating entirely costly erection and removal of shoring, catwalks and wood forms. The USF Steel Form is specifically engineered for this service, with more than adequate capacity to support the required amount of wet concrete.

Send for illustrated data sheet.

UNITED STEEL FABRICATORS, INC.

WOOSTER, OHIO

PRODUCTS

Hollow Metal Doors • Prefabricated Metal Buildings • Window Wells • Highway Guard Rail • Bridge Flooring • Steel Forms for Concrete Bridge Floors • Corrugated Metal Pipe • Sectional Plate Pipe and Pipe Arches

. . . for more details circle 361 on enclosed return postal card

Personals

John Swanberg Appointed Chief Engineer in Minnesota Dept.

John H. Swanberg, veteran in the Minnesota department of highways, has been appointed chief engineer. He succeeds L. P. Zimmerman, who was promoted to state highway commissioner. The move-ups are in the wake of the recent retirement of Commissioner Hoffman.

Swanberg was recently chief construction engineer, and prior to that was for 10 years engineer of materials and research, in which post he made major contributions to the improvement of highway standards in his state and obtained a national reputation.

John H. Swanberg

LEON BELKNAP, for 31 years engineer-manager for the Road Commission of Oakland County, Michigan, has retired. He is succeeded by Paul Van Rockel, who has been manager for the Howard County (Iowa) Road Commission.

Mr. Belknap, who will continue as a consultant, is one of the pioneers in Michigan highway work, having seen his road system grow from the Model-T days and participated in many technical advances.

GEORGE M. FOSTER, recently defeated in his run for the elected post of Michigan State Highway Commissioner, has been appointed head of the Indiana State Highway Department.

Foster who has been chief deputy commissioner in Michigan goes to the newly created $18,000 per year post set up by Governor Handley in Indiana.

(Continued on page 23)

TRUCKS GO

when they are equipped with

EATON 2-SPEED AXLES

Wherever trucks have to go—on or off the highway—Eaton 2-Speed Axle equipped trucks go quicker—and at lower cost per mile. That's because Eaton 2-Speeds provide a *right* gear ratio for every hauling situation.

To enable truckers to "make time" on the open highway, Eaton 2-Speed Axles provide a HIGH-HIGH ratio—trucks GO at top legal speeds. When POWER is needed on steep grades or to pull out of tough off-the-highway spots under full load, drivers select the LOW-LOW ratio—and GO! This wider choice of gear ratios means reduced stress and wear on engines and other vital truck parts. It means that Eaton 2-Speed Axle trucks keep GOing for many extra thousands of trouble-free miles—they cost less to operate and maintain, and are worth more at trade-in time.

More than Two Million Eaton Axles in Trucks Today. For complete information, see your truck dealer.

EATON — *AXLE DIVISION*
MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioning Fastening Devices • Cold Drawn Steel • Stampings • Gears • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

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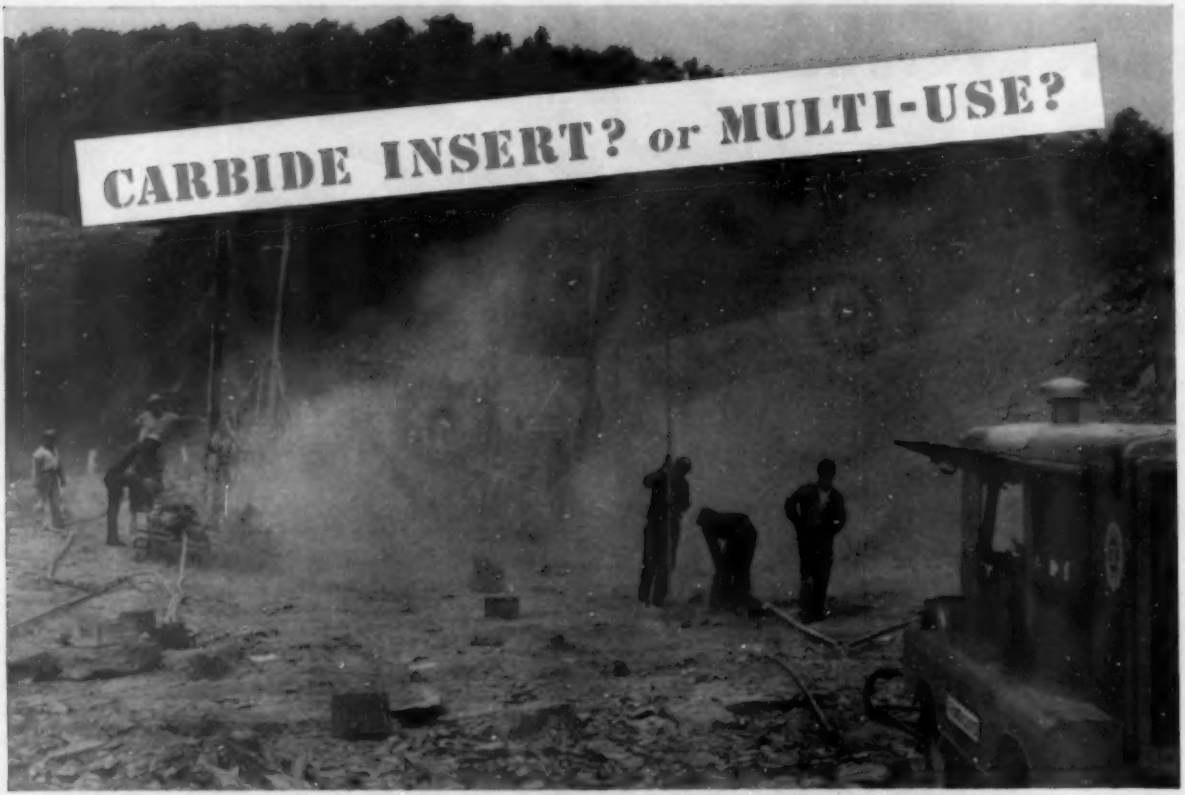

LOCATION: Route 40, Martins Mountain, Cumberland, Md. **OPERATING CONDITIONS:** Medium limestone.

The Bero Construction Corp. and the Via Company Inc. relocate Md. Route 40, cut drilling costs with TIMKEN® carbide insert bits

IN relocating 2.4 miles of Route 40 at Martins Mountain east of Cumberland, Md., Via Company Inc. had to drill through limestone. To get maximum production, keep bit cost per foot-of-hole at a minimum, they used Timken® carbide insert bits.

For hard, abrasive ground, Timken carbide insert bits give you greatest economies. They permit faster drilling with fewer bit changes.

But carbide insert bits may not do the most economical job in every case. In ordinary, less abrasive ground, Timken multi-use bits save the most. When correctly controlled and reconditioned, Timken multi-use bits lower your cost per foot-of-hole when full increments of steel can be drilled out.

Both types of Timken bits save drilling time because they are interchangeable in the same thread series. They let you switch bits on the same drill steel as the ground changes, right on the job. And the special shoulder union of Timken bits protects against drilling impact, adds to bit life.

Timken rock bits are made from our own electric furnace fine alloy steel. We're the only American rock bit manufacturer that makes its own steel. Let our experts help you select the best bit type for your particular drilling job. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

Timken threaded multi-use rock bit

Timken threaded carbide insert rock bit

your best bet for the best bit ...for every job

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

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ROADS AND STREETS
Sixty-Five Years of Editorial Leadership

Washington News Letter

By Duane L. Cronk

August 10, 1957

Are small contractors getting their share of the big $50-billion roadbuilding market? The Small Business Administration here has been putting the heat on the Bureau of Public Roads for assurance that small operators are given a cut of the construction contracts. This agency has authority to screen contracts let by federal agencies, and to recommend which ones it believes should be set aside for bids from small business only. There is considerable pressure to extend this agency's powers just now.

Congressmen adamantly insisted that a clause go into the last federal-aid act specifying that ample opportunity be given small business to participate in the roadbuilding effort. However, because federal-aid highway projects are contracted by state highway departments, not the federal government, the Small Business Agency has no jurisdiction in this area, yet.

Actually, this is no problem, BPR figures reveal. The great bulk of federal-aid contracts last year (a whopping 89%) were for under $1 million, nearly 84% are for less than $500,000, and 28% for less than $100,000. When you consider the amount of the large contracts that filter down to smaller firms through subcontracting, the real amount of highway work being accomplished by small contractors becomes apparent. And these figures do not include Secondary system contracts which average considerably smaller.

* * *

Surveying of the new cross-country Interstate routes may be rapidly stepped up by a new radar device for measuring distance. The "tellurometer," developed by South African scientists, can measure a 20-mile line in about an hour, eliminating the work of probably 10 men for three weeks. The instrument is composed of two units, each costing about $5,000. A "master" unit sends out the radar waves; a "slave" unit set up at the other point receives them. In a demonstration, the 85-lb. device was accurate to less than one inch to the mile.

The device holds considerable promise for highway work, BPR's expert on electronic devices, L. R. Schureman, believes. It is very accurate, is practicable for measuring distances as short as a mile with 1-inch accuracy. In rough terrain particularly, it would be substantially more economical than manual methods. The Bureau plans to test the tellurometer on one of its own projects in the West soon.

* * *

The Bureau of Public Roads has told roadbuilding it cannot reimburse state highway departments for money advanced to contractors in payment for materials. The Associated General Contractors of America had hoped the bureau would adopt

(continued on next page)

this procedure and thus encourage more states to pay contractors for materials when delivered to the project. The agency explained that the 1916 Federal-aid Act prohibits them from paying for materials until they are actually incorporated into the structure.

"This is one way a contractor could get some of his operating capital back," Jim Sprouse, AGC Highway Division manager said. "Such a procedure would probably encourage advance purchasing and stockpiling, which in turn, might prevent unnecessary delays. We all know that credit is a real problem with builders these days, and it would mean a lot to a contractor to be repaid more of the large sums of money he must put into concrete, steel and other materials."

Many states do reimburse contractors for their materials outlay when they are delivered. Some pay 50% of the cost; others up to 90%. But the pattern is far from uniform.

* * *

New route markers designed solely for the 41,000-mile National Interstate System will be decided upon this month. Alf Johnson, executive secretary of the American Association of State Highway Officials, told Roads and Streets that the ideas submitted by highway officials for the special route markers have been narrowed down from 76 to four. Samples of these "finalists" are now being produced and tested under various lighting and weather conditions. This month, engineers will finally decide which one is to designate the superhighways roadbuilders are now beginning to construct for the motorist of 1975. Also, a nationwide numbering system for the network will be announced soon. By late fall, completed sections of America's proudest highways will be sporting the new markers.

A manual of traffic signing for the high-speed expressways is also in the works. Another AASHO committee, utilizing knowledge of driver behavior on the nucleus of expressways and toll roads already in use, is developing recommendations for guide signs which can be read at 75 miles per hour. The modern controlled-access highways are necessitating entirely new concepts in signing. The future signs must be much larger, more scientifically spaced and positioned. Chances are that letters will be 18" to 24" high.

* * *

The cement strike may be settled by the time this is read, but it will have had a disheartening effect on road projects in many, many areas. East Coast states have been particularly hard hit. Right now contractors have had to abandon 180 jobs in New York state alone. A number of big projects have been shut down in the New York City area, where, engineers say, a week's delay can mean a 3 month lag in completion through an unavoidable chain reaction. Contractors on the $465 million Connecticut turnpike were knocked out of the running early. Massachusetts and Pennsylvania road builders' operations were slowed to a standstill.

Here in Washington, federal officials and congressmen are openly worried about what the resulting cement price increases will do to highway contract costs. If the strike becomes nationwide, and union demands are met, road builders undoubtedly will be paying considerably more for cement in the fourth quarter.

WATCH FOR FIRESTONE WHEN THE BIG PUSH IS ON!

Firestone Rock Grips lead all tire choices where highways end—and big jobs begin!

Firestone Tubeless Rock Grips save time where you're pushing big projects. That's because of two great tread designs that carry your heavy equipment *over any terrain!* They eliminate your need for changing tires to match the job. You get the *full flotation* you need for sand and soft stuff. You get the *armored grip* you want for rough runs over broken rock. Safety-Tensioned *Gum-Dipped*® NYLON bodies combined with cut-resistant treads make these tires top choice for off-highway users. Your Firestone Sales Engineer can show you why you'll make them *your* top choice, too. Contact him today—through your local Firestone Dealer or Store.

ROCK GRIP WIDE BASE ROCK GRIP

Firestone

BETTER RUBBER FROM START TO FINISH

Copyright 1957, The Firestone Tire & Rubber Company

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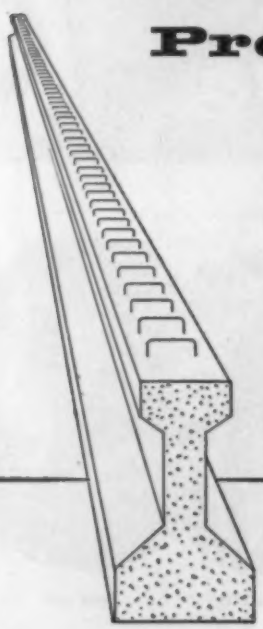
Grade separation structure near Atlantic City, N. J., carries 90-ft. Garden State Parkway over U.S. 322. Spans are 58 ft. long, girders 33" deep.

Extra bridges from your highway budget with

Prestressed Concrete



Thousands of bridges, grade separations and trestles must be built on the National System of Interstate and Defense Highways. Engineers should know how to get extra bridges from their highway budgets.

One way to make substantial savings is to use a basic design for most bridges. Production line techniques then can be employed to lower unit costs of fabricating precast, prestressed concrete members. Using a standard design will also save designers' valuable time, freeing them for work on other projects.

Prestressed, precast concrete eliminates the need for expensive falsework. Since members are smaller, dead weight is reduced. This simplifies transportation, speeds erection. Having unusual durability and requiring little maintenance, prestressed concrete bridges deliver ***low-annual-cost*** service. Send for helpful free literature. It is distributed only in the United States and Canada.

Portland Cement Association

Dept. A8-28, 33 West Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

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Personals

(Continued from page 16)

ALLEN M. WILLIAMS, 38 years on the job as county engineer of Ionia County Road Commission in Michigan, has resigned to "take a rest". Williams gained national recognition during his long tenure, and is currently president of the county and local road division of the American Road Builders' Association.

KNUT H. JENSEN is appointed chief bridge engineer of the Pennsylvania department of highways. He was a bridge engineer for the Pennsylvania Turnpike commission for a number of years, in charge of design and construction and prior to that with consulting firms.

PATRICK J. GRANEY, SR., has been appointed State Road Commissioner of West Virginia. He succeeds M. L. O'Neal, who was acting commissioner and who returns to his previous job as chief engineer.

The 1957 Legislature in a reorganization law just passed raised the salary of the commissioner to $14,000. The job is for four years. The new law also calls for a 7-man commission. Mr. Graney who is a civil engineer has been assured a "free hand" in planning a program based on priority of need "regardless of political considerations."

AED Local Elects Economou

N. N. Economou, general manager, Construction Equipment division of Metalweld, Inc., is the new president of the Philadelphia-Delaware Valley AED, Associated Equipment Distributors.

N. N. Economou

CARAVAN AXLES

rugged *Trouble Free* mobility

Caravan axles are your guarantee of "Rugged, Trouble Free Mobility" on rough construction terrain and for positive high speed trailing. Your men in the field are assured of dependable performance when their mobile equipment is mounted on quality-built axles by UNITED.

Caravan axles are available as single axle, two wheel assemblies and as four-wheel running gear. Equipped with automotive type steering mechanism, adjustable camber, caster and toe-in.

Designed and engineered for construction, military and industrial equipment with a capacity up to 20,000 pounds.

Literature and individual counsel are available upon request.

UNITED

THE UNITED MANUFACTURING CO.

3637 WEST 56TH STREET • CLEVELAND 2, OHIO

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10,000 Holes Through Man-Hole Covers?

This Mobile Outfit Drilled 'Em Easy

● By merely stopping the tractor and pushing a switch, the driver is able to drill with the Schramm Pneumajack. Similar applications for this unit include drilling holes in pavement for mudjacking, undersealing and parking meter installation.

MOVING from place to place under its own power and solving a costly service and maintenance problem—a compressor-tractor unit saved Philadelphia Electric Co. $16,900 on its first job. After completing its initial assignment of drilling two holes in 5,000 manhole covers, the unit—a Schramm Pneumatractor equipped with a Pneumajack—was converted to other work.

The problem was brought about when Philadelphia Electric Co. bought a part of the underground duct system of the old Keystone Telephone Co. of Philadelphia. Keystone had made expansion provisions which had never been used. A part of these provisions was the completely unused duct system.

The newly acquired duct system included 5,000 manholes. The 300-lb. manhole covers had grooves on the outer ring and had to be lifted with a crowbar. Philadelphia Electric had long standardized on a cover with two holes that permitted hooks to be inserted for removal.

When the electric company attempted to drill two holes in the Keystone covers—so that these, too, could be easily removed—they found that the covers had been cast from scrap metal and had varied degrees of hardness. According to one maintenance official, "some would drill like a hot knife going through butter and others would require a whole day of breaking bits."

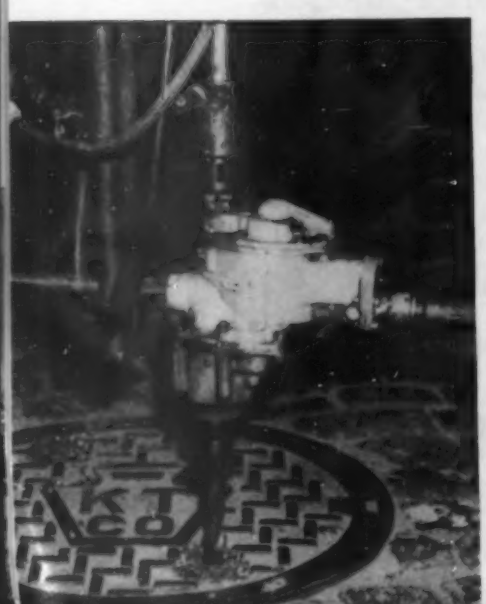
Because the company found it could not drill these covers at a reasonable cost, it decided to call in a contractor to handle this problem. The contractor quoted $4.60 per cover or $23,000 for the job and estimated the job would take two years. The company felt this cost was prohibitive.

An employee suggested the use of a Pneumatractor equipped with the special drilling apparatus known as a Pneumajack. These are wheel-type tractor-mounted compressors in which the tractor is built under and around the engine-driven compressor. The same engine that drives the compressor also furnishes the tractor power. The Pneumajack is a portable wagon drill that attaches to the tractor and operates from its compressor.

It was necessary to secure a new bit with a flatter cutting surface—as opposed to the very sharp cutting edge in a normal drilling bit—to insure against bit breakage. Pressure modifications were made to the Pneumajack in order to tailor it to this particular application.

When in use, this equipment allows one man to do the entire job. In drilling the covers, the operator drives the tractor to the manhole location, drills two holes in the cover, and then moves on to the next location. One man can drill 64 manhole covers per day.

The cost of drilling 64 covers by the contractor method at $4.60 per cover would amount to $294. By comparison, even by setting an exaggerated cost of $94 per day for the electric company man's time, plus cost of operation and depreciation on the equipment, there is still a saving of $200 per day with this unit. Moreover, the one-man unit was able to complete the entire job in less than a year.



● Powered by 125 cfm of compressed air from the tractor, the Pneumajack drives a bit with a special cutting edge through a manhole cover.

Just how effective are rubber-alloyed seal coats?

WE THINK you'll be pleasantly surprised at how effective seal coats can be *when* the binder is alloyed with RUBARITE. Let's take the case of the county road in a prominent Western state (pictured at left) as an example.

As you can see, the road surface was in poor condition. So poor, in fact, that the county officials decided upon a seal coat only as a temporary measure—planned to rebuild the road the following year. However, as an experiment, they put down an asphalt cement reinforced with RUBARITE.

RUBARITE is a powder of unvulcanized synthetic rubber combined with minute particles of a special carrier. It not only handles easily, but disperses rapidly and thoroughly in asphalts or cut-backs with these results: Substantially increased toughness or strength. Much greater, longer-lived adhesion. Much improved ductility and flexibility. Considerably less susceptibility to heat, cold and oxidation.

During application of the RUBARITE asphalt cement the officials were well pleased with the way it spread and penetrated the many checks and cracks. They were even more pleased with the thick mat and excellent early adhesion that resulted, particularly on one stretch of road where there was a four-hour delay in placing the stone with the air temperature about 50-55°F.

Their greatest satisfaction came a year later, however, when they inspected the job after a particularly wet winter. The surface was in such good condition that plans for rebuilding were dropped. Instead, it was decided to insure the serviceability of the road for years to come with another RUBARITE seal coat.

This project is just one of a number of cases in our files which fully prove the effectiveness of seal coats made with RUBARITE. If you'd like to see the further evidence, just write to: Rubarite, The Goodyear Tire & Rubber Company, Akron 16, Ohio.

RUBARITE by GOODYEAR

THE GREATEST NAME IN RUBBER

Rubarite—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

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2 sure ways to reduce COMPACTION COSTS

THE BARCO RAMMER

Put Barco Rammers on the job and watch the results. One of the biggest advantages they offer is ability to handle work in minimum time.

HIGH DEGREE COMPACTION — In test after test, Barco Rammers have demonstrated their ability to deliver 95% to 97.5% compaction (modified Proctor Method) — EASILY . . . EFFICIENTLY . . . ECONOMICALLY!

FOR TOUGH JOBS — The Barco Rammer is especially useful for compacting fill in restricted areas close to walls, culverts, and abutments—in trenches, ditches. ONLY the Barco Rammer can produce specified high degree compaction on lifts up to 20 inches.

ONE MAN OPERATION — On area tamping, one man can average 20 to 30 cubic yards of fill per hour. On trench backfill, using lifts up to 24", the rate for 18" trench is 360 to 600 feet per hour. *Ask for Catalog 621.*

THE BARCO VIBRA-TAMP

The new Barco VIBRA-TAMP is a proven tool—superior in design and performance — backed by leading equipment distributors representing Barco in all parts of the country.

VERSATILE PERFORMANCE — For vibratory compaction of granular base materials and tamping bituminous surfacing.

ECONOMICAL—to buy, operate, and maintain! No special tools required. Saves your bigger, costlier equipment. Tamp up to 750 sq. yds. per hour. A real work-horse on sand, gravel, soil, chippings!

EFFICIENT, DEPENDABLE—One man does the work of many with VIBRA-TAMP. Self-propelled. Operates in any weather. Works flush against curbs, foundations, and walls. Simple design and quality construction keep the machine on the job day in and day out. Moving parts fully enclosed. Handle adjustable to comfortable height. *Catalog 630.*

FOUNDED 1902
BARCO
PRODUCTS BACKED BY EXPERIENCE

BARCO MANUFACTURING CO.
515J Hough St.
Barrington, Illinois

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New Publications

New Catalog Gives How and Why on Uses of Explosives

Facts and figures to help users of explosives, as well as descriptions of the company's complete line of explosives products, are included in a new edition of its 48-page catalog just published by Atlas Powder Co. Containing more than a score of tables and over 100 illustrations, the book provides specific assistance in the selection of explosives. The first quarter of the book summarizes in text and pictures the most effective and economical explosives materials and methods as employed in nine major industries. Over 150 items are listed in the catalog section. Complete information, in text and tabular form, is included to describe the properties and appropriate areas of application of eighteen types of high explosives, six low order blasting agents, blasting caps (including a section describing the Rockmaster millisecond delay blasting system), blasting machines (including the 1200-cap Shotmaster condenser-discharge type blasting machine), safety fuse, and other blasting accessories and supplies. The booklet, entitled "Atlas Explosives Products," is available without cost to users of explosives by writing, on company letterhead, to Explosives division, Atlas Powder Co., Wilmington 99, Del.

Announce New Lefax Books

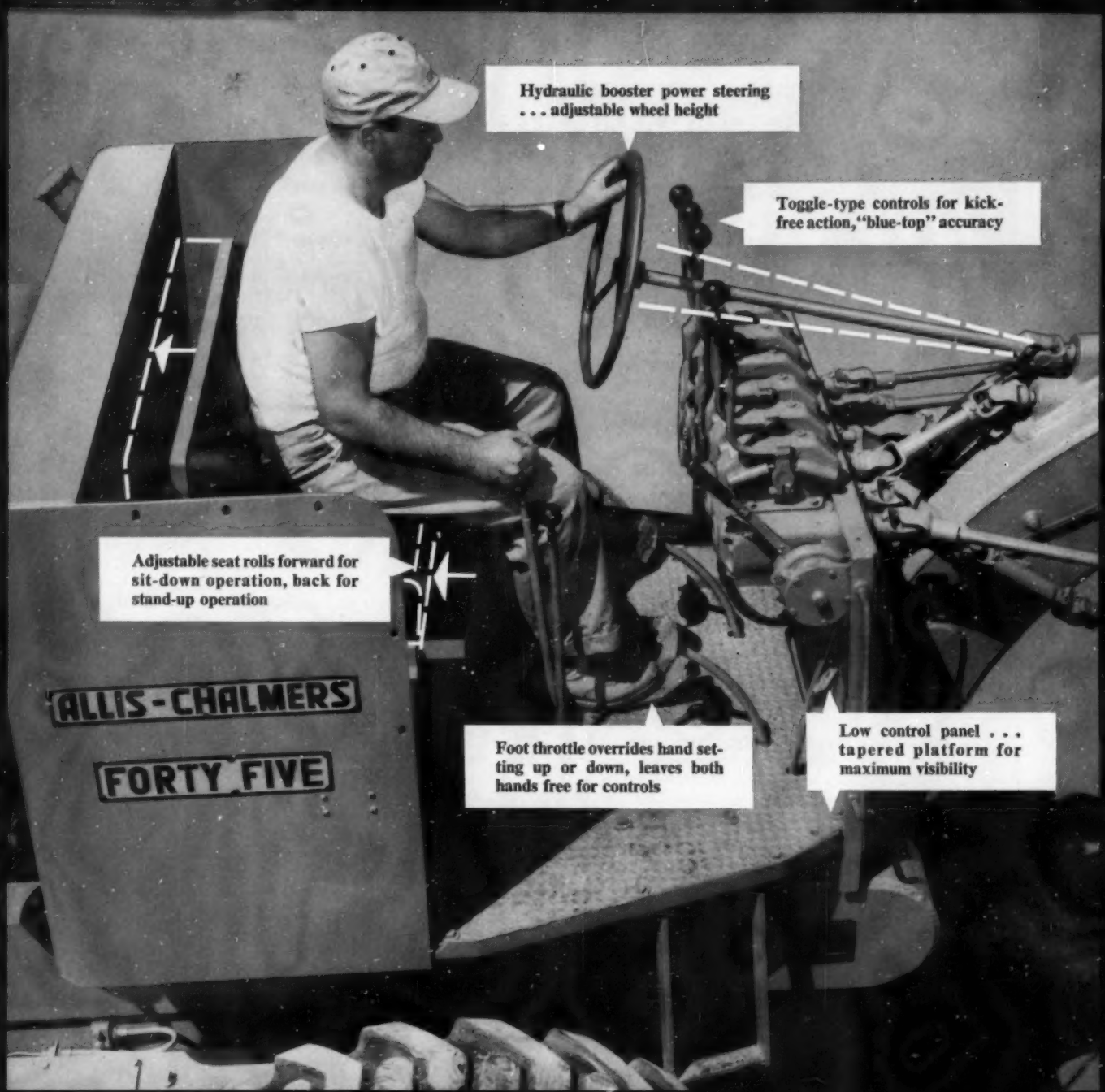
MANUAL OF MATHEMATICS. Contains mathematical reviews, logarithmic tables, natural trigonometric functions, conversion tables, functions of numbers, etc., trig and log tables and others of accuracy and reliability. Price with binder $4.25, Pin cover $2.25.

MATHEMATICAL TABLES. All the formulas and tables you need to solve everyday problems of arithmetic, geometry, algebra, trigonometry, analytic geometry and calculus. Cloth binder $3.25, Pin cover $1.50.

CHEMICAL TABLES. A new complement of chemical tables covering the physical and thermodynamic properties of inorganic and organic compounds. 320 pages in binder $4.00, in two Pin cover $2.50.

Above books available from Lefax Publishers, 9th & Sansome Streets, Philadelphia 7, Pa.

(Continued on page 28)


Hydraulic booster power steering . . . adjustable wheel height
Toggle-type controls for kick-free action, "blue-top" accuracy
Adjustable seat rolls forward for sit-down operation, back for stand-up operation
ALLIS-CHALMERS
FORTY FIVE
Foot throttle overrides hand setting up or down, leaves both hands free for controls
Low control panel . . . tapered platform for maximum visibility

FIVE WAYS YOU CAN BOOST GRADER PRODUCTION

. . . through operator comfort and control!

Features like these make satisfied operators . . . mean more production for you. They're yours in an Allis-Chalmers FORTY FIVE—120 brake hp, 23,800 lb. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

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ALLIS-CHALMERS *Engineering in Action*

Contractor Expedites Road Construction with LIME STABILIZATION

Distributing hydrated lime on highly plastic clay subgrade of Interstate freeway near Belton, Texas.

Neelley Farquhar, Contractor

In one 14-mi. section of the Dallas-San Antonio Interstate freeway now under construction (near Belton, Texas), 6% hydrated lime is being used in the subgrade to stabilize a weak, highly plastic clay (P.I. of 50).

Here's what the contractor — Neelley Farquhar, Pelphrey-Farquhar, Inc., Fort Worth—has to say about lime stabilization expediting construction on this $2.17 million project:

"During February and March, we had 10 inches of rainfall on the job, yet our subgrade and subbase construction proceeded on schedule, thanks to lime. This was possible because the compacted lime-treated subgrade shed the rain and dried out quickly. In one instance, we delivered 25-ton truckloads of foundation stone on the completed subgrade within 30 hours after a 3-inch rainfall. Without lime stabilization, this rainfall would have delayed us nearly a week."

Here are other ways lime stabilization expedites construction:

Fewer passes required **with mixing equipment, since lime and water help pulverize the soil by breaking down clay clods. Helps grading too.**

Promotes more thorough mixing **because of sharp contrasting whiteness of lime with soil.**

Lime-soil mixtures can be retempered. **If rains occur during the mixing operation, no damage is done since the slow-setting lime and soil can be reworked, recompacted, and even reshaped.**

Lime stabilization — 10 to 12 years successful durability experience—over 1000 miles constructed.

Write for further information and ***FREE*** *booklet:*

"LIME STABILIZATION OF ROADS"

NATIONAL LIME ASSOCIATION

925 15th STREET, N.W., WASHINGTON 5, D. C.

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New Publications

(Continued from page 26)

APPLIED STRENGTH OF MATERIALS. By Alfred Jensen, McGraw-Hill Book Co., Inc., 330 W. 47th St., New York 36, N. Y.—Price $5.75.

This 343 page student text book includes such features as development of all formulas without calculus; emphasis on physical relationships of cause and effect, action and reaction; special attention to application of design formulas to actual problems. Topics covered include axial stresses in members of two materials, eccentrically loaded riveted joints, etc.

RESPONSIBILITY FOR CONSTRUCTION, MAINTENANCE AND TRAFFIC REGULATION ON EXTENSIONS OF STATE HIGHWAYS THROUGH CITIES AND TOWNS. Circular 337, the Highway Research Board, 2101 Constitution Ave., Washington, D.C.

This pamphlet includes material made available through Fred J. Herring of the Arkansas State Highway Commission. Copy available on request to the Board.

ENGINEERING STRUCTURAL FAILURES. By Rolt Hammond, with a foreword by Sir Bruce White, contains world wide information of interest to designers of all types of engineering and industrial structures involving steel and other construction materials; also earthworks, vibration problems, welding, etc.

Price $12.00—Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y.

CALCIUM CHLORIDE FOR STABILIZATION OF BASES AND WEARING. Courses. A 4-page illustrated manual SM-1 published by the Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C. Available free of charge on request.

The booklet gives examples of how dense graded aggregate bases with calcium chloride have withstood the test of time.

TRUCK FACTS. The 1957 edition of this familiar statistical reference has been published by the Automobile Manufacturers Association, New Center Building, Detroit, Mich. Available on request to the association.

(Continued on page 32)

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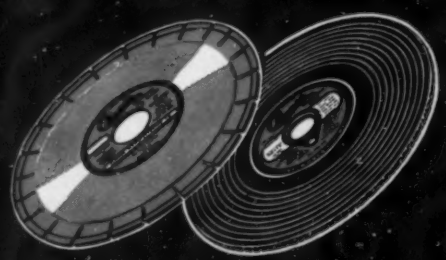

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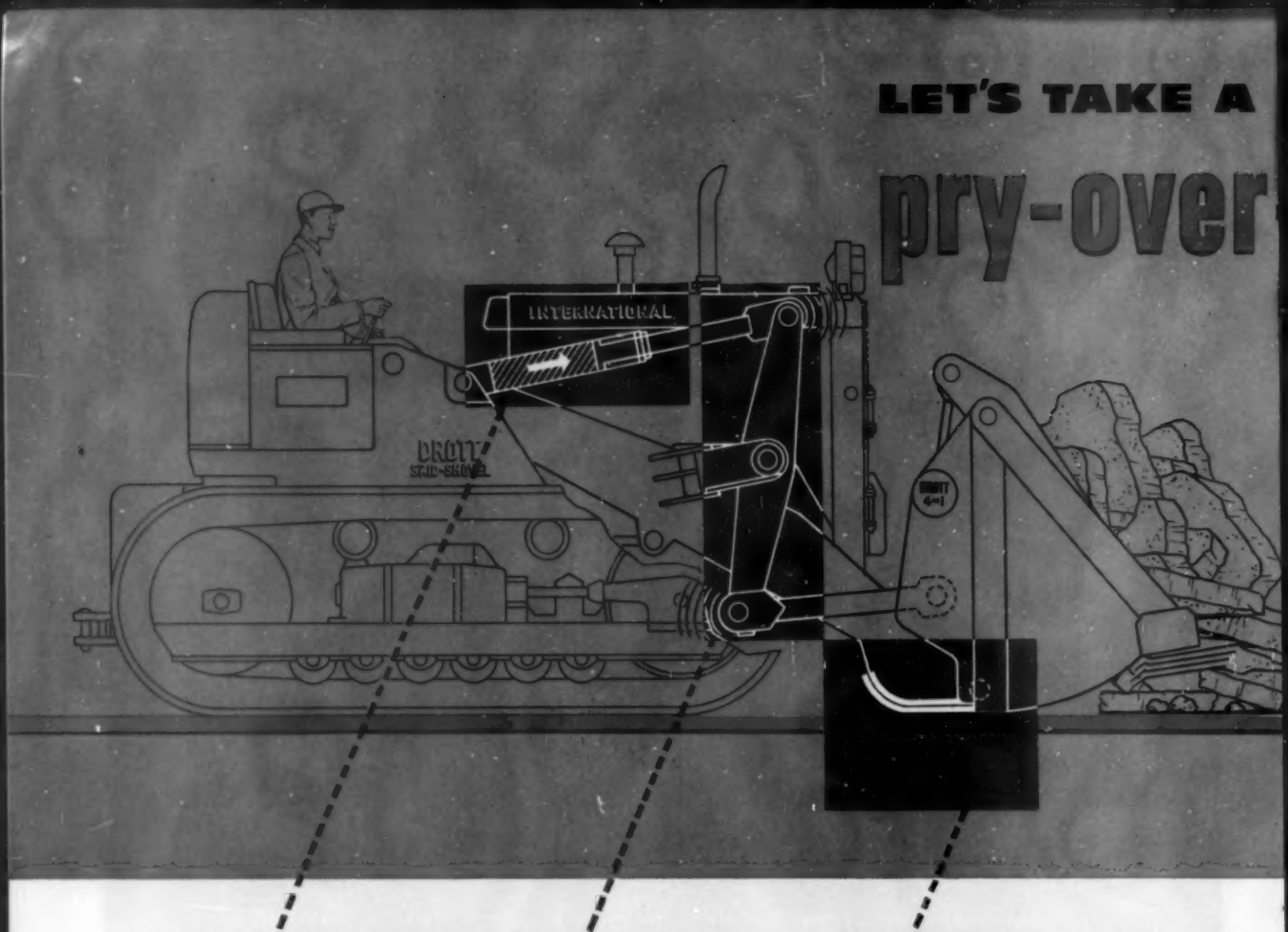
LET'S TAKE A pry-over



Full hydraulic power transfer! Famous International Drott *triple-power* hydraulic force results from ingeniously applying oil pressure upon the piston's *full face*—instead of using the customary, and limited, rod-end area for the "power-push" surface! Only International Drott gives you this tremendous hydraulic power to produce concrete-smashing, tree-grubbing, boulder-bucking pry-action break-out!

Far greater leverage. See how International Drott scientifically-correct *lever length* transfers *full* triple-power hydraulic force to the fulcrum. No costly power-dissipating "step-downs" here to lose one-fourth to one-half your hydraulic power, as ordinary design does! Instead, International Drott full power-applying leverage gives you tough-job-handling digging force and capacity ordinary loaders can't even begin to equal!

Ground-based fixed fulcrum! Here's how exclusive International Drott design provides the famous frame-mounted skid-shoes—to act as the absolutely necessary *fixed fulcrum.* Without this, true pry-action break-out is impossible. The big *exclusive* International Drott skid-shoes provide the steady, ground-based platform for true ground-level bucket-heaping roll-back of 41°!

Prove to yourself you command a vast new job-range and capacity—with this super-powerful excavating, bucket-heaping pry-action. See what happens when you team this performance with the *versatility unlimited* of an exclusive Four-In-One. Compare how *exclusive* shock-swallowing Hydro-Spring "gentles" trouble-causing impact by 67%! Ask your International Drott distributor for a demonstration!

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin

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CLOSE LOOK AT TRUE

—shoe break-out action

Only <u>original</u> and <u>exclusive</u> International Drott design transfers <u>full</u> hydraulic power to give you tremendous <u>extra</u> excavating force!

Genuine pry-action break-out has three absolute essentials: (1) *full hydraulic power transfer;* (2) *long lever,* to apply pry-power without power loss; (3) *fixed fulcrum,* located to concentrate break-out force for maximum effect.

Here's how exclusive International Drott "separates the men from the boys" in heavy-duty loader design—and gives you front-end loader performance and capacity nowhere else available.

Kuschler Construction Co., New Orleans, Louisiana, specializes in demolishing old service stations to be replaced with super-service stations.

Kuschler tore down this old station in one day, then removed the concrete work the second day—doing the entire job with their International Drott TD-9 Four-In-One!

Previously, the contractor demolished the buildings and concrete with compressed air hammers and a three-man crew. Their other make of front-end loader, without true pry-action break-out, was limited to loading debris.

Now, one man, using triple-power International Drott pry-action break-out, accomplishes as much in one day as the three-man crew and four separate items of equipment were able to do in a whole week!

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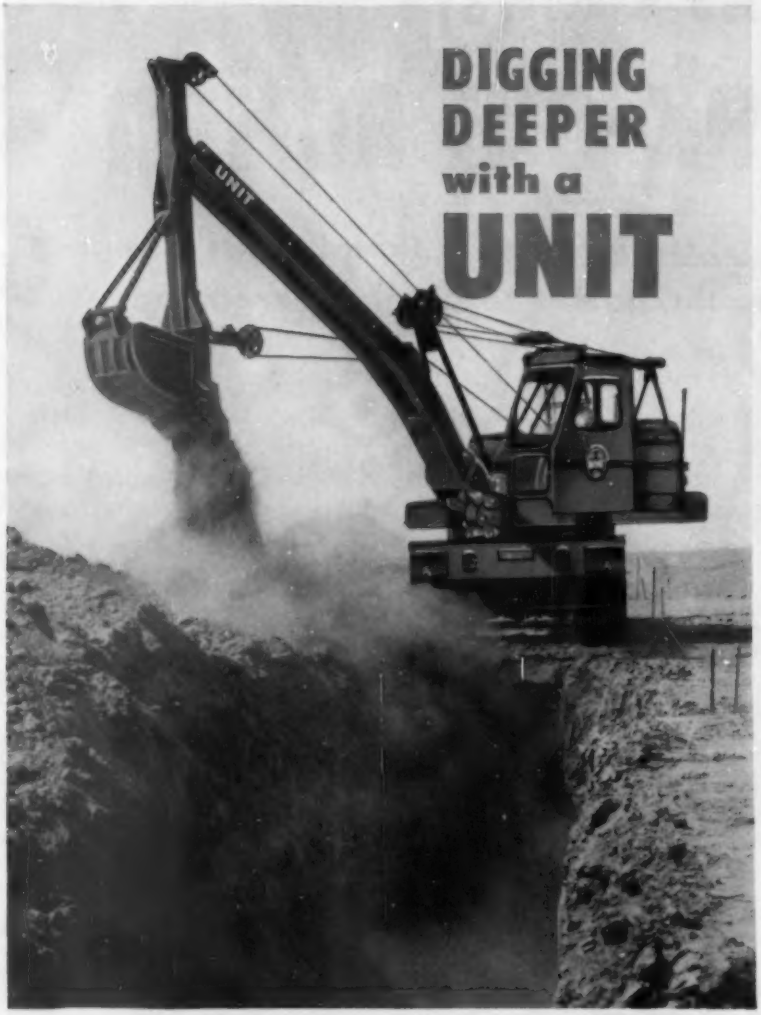

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Accurate deep digging of trenches for pipelines, sewers, water connections, footings, basements and culverts is easily and quickly accomplished with a UNIT Trenchoe. The "Goose-neck" boom with its long deep reach assures maximum production. Also saves time trimming vertical sidewalls and corners, and in leveling floor surfaces. Powerful... Compact... Perfectly Balanced. Every UNIT is designed to meet the most rigid demands. Investigate today and earn more pay.

UNIT models are available in ½ or ¾ yard Excavators . . . Cranes up to 20 tons capacity . . . Crawler or Mobile types . . . Gasoline or Diesel. Ask for literature.

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New Publications

(Continued from page 28)

REINFORCED CONCRETE DESIGN HANDBOOK. A new edition of the CRSI Design Handbook has been issued by the Concrete Reinforcing Steel Institute, 38 South Dearborn Street, Chicago 3, Illinois, price $6.00 with money-back guarantee of satisfaction by the publisher. The new handbook was prepared under the direction of the Institute's committee on engineering practices and contains over 400 pages, including material on floor systems; beams; columns; footings; retaining walls; etc.

ENGINEERS EMPLOYED BY PRIVATE PRACTITIONERS—this 49-page report published by the National Society of Professional Engineers, contains basic facts on salaries, hours, geographical distribution of engineer employees, size of the consulting firms, fringe benefits, overtime pay practices, etc., result of a recent questionnaire survey.

Copies available at $1.00 each remitted to the Society at 2029 K Street, N. W., Washington 6, D. C.

"HIGHWAY ENGINEERING TRAINING PROGRAMS," compiled by Committee on Education and Training of Highway Engineering Personnel, special report 24 and "Utilization of Highway Engineering Manpower," nine papers presented at Highway Research Board meeting, January, 1956—published by Highway Research Board, 2101 Constitution Ave., Washington, D.C.

WATER CONTROL WITH GUNITE. An informative bulletin showing methods of lining ditches and channels, with "right" and "wrong" ways of doing work pictures. Available on request to Gunite Contractors Association, 714 West Olympic Blvd., Los Angeles 15, California.

HEEDLESS HORSEPOWER. The 1957 book of street and highway accident data, published by The Travelers Insurance Companies, Hartford, Conn. A wealth of data on accident statistics and causes, together with dramatization which makes the book effective as an educational piece for the motoring public. More than 2,700,000 copies of previous editions distributed. Recommended reading.

(Continued on page 36)

WORLD'S SAFEST POWER SAW

NO WHIPPIN', KICKIN' CHAIN

...just guide it and relax!

• hand saw safety
• power saw speed

Photo Courtesy of C. B. & Q. Railroad

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20" RECIPROCATING BLADE

Saves time, money on 1001 jobs: Cuts sheathing, piling, concrete forms, ties; does *precision* mill-edge cutting; clears land; ideal for bridge-work and wrecking.

- Cuts in all positions.
- Sharpens blades in 5 min.—right on the job!
- Minimum service—fewer moving parts—no chain
- Operator needs no special training.
- Less than 25 lbs. complete.

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21" RECIPROCATING DOUBLE BLADE

Exceptionally lightweight—big capacity. No fumes... no spark hazard. Actually cuts under water! Connect to any 60 cu. ft. compressed air supply...does everything the *Rebel* does!

- Slices 12 x 12's in less than a minute.
- Unbreakable blades.
- Only 14½ lbs. total!
- Precision cuts—even in 12" radius!

ONLY **$295.00***

*Price includes 20" blade. F.O.B. Sheboygan, Wis. Price applies in U.S. only.

WRIGHT AIR LINE OILER

Gives trouble-free lubrication to Wright Air Saw or other pneumatic tools. Meters oil into air supply. Light weight 1¾ lbs. ½ pint capacity. Non-clogging, works in any position. ONLY **$19.95**

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B.F.Goodrich

All-Nylon B.F.Goodrich tires give over 4 years' service to highway excavator

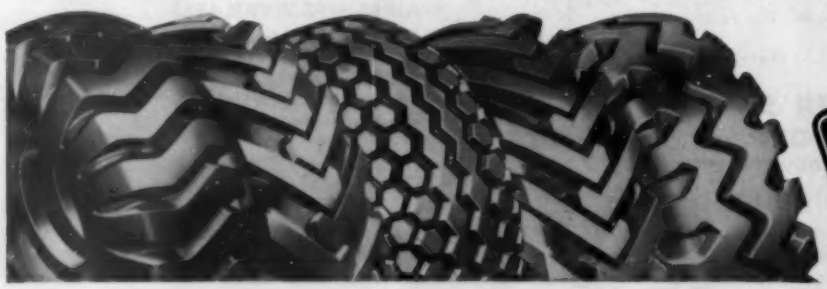
GASPARINI EXCAVATING CO., INC., of Peckville, Pennsylvania, does highway and heavy construction work. Here the company's equipment is at work on the Pennsylvania Turnpike, hauling giant loads over rock-strewn roads. For this rugged work, the company uses B.F.Goodrich FLEX-RITE nylon tires, reports many give over 4 years' service, including 2 retreads.

"B.F.Goodrich *all-nylon* tires have minimized breakdowns, impact breaks and other cost and time-consuming delays," writes President Gene Gasparini. "They help us give maximum contract performance in the shortest contract period."

B.F.Goodrich tires are built with FLEX-RITE nylon cords. FLEX-RITE nylon cords withstand double the impact of other cord materials, resist heat blowouts and flex breaks. Result: more retreadable B.F.Goodrich tires!

Your B.F.Goodrich dealer has a complete line of tires for every off-the-road job, including the new Rock Service Tubeless or tube-type (far left) for mining, quarrying and dirt-moving jobs. And he offers expert, on-the-job tire service. See him today or write *B.F.Goodrich Tire Co., A Division of The B.F.Goodrich Co., Akron 18, Ohio.*

There's a B.F.Goodrich tire for every construction job



Specify B.F.Goodrich tires when ordering new equipment

B.F.Goodrich
FIRST IN RUBBER

Your B.F.Goodrich dealer is listed under Tires in the Yellow Pages of your phone book

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New York State Thruway Uses ALLIED Jet Seal

Equipment for laying Allied JET SEAL comes in one compact unit that assures proper installation.

Allied JET SEAL is contained for maximum protection, quick identification and easy mixing.

The New York State Thruway is one of the most modern and up-to-date traffic arteries in the world. It now stretches 427 miles from New York City to Buffalo and is being extended five ways —to Erie, to Niagara Falls, to Massachusetts, to Connecticut and New Jersey.

To protect the tremendous investment in this beautiful highway, the Thruway Authority seeks only the best materials for construction and maintenance. Here, Allied JET SEAL has won distinction as the preferred sealant for protecting the more than 500 bridges on the super-highway.

Allied JET SEAL is outstanding for its extreme ruggedness, superior adhesion, cohesion and low temperature ductility. Allied JET SEAL has no cold flow tendencies even above 300°. It is easily applied, sets up quickly, and is ready for traffic with minimum delay. The Thruway Authority believes that its greater life expectancy makes it more economical, in the long run, than the less effective sealants it is destined to replace.

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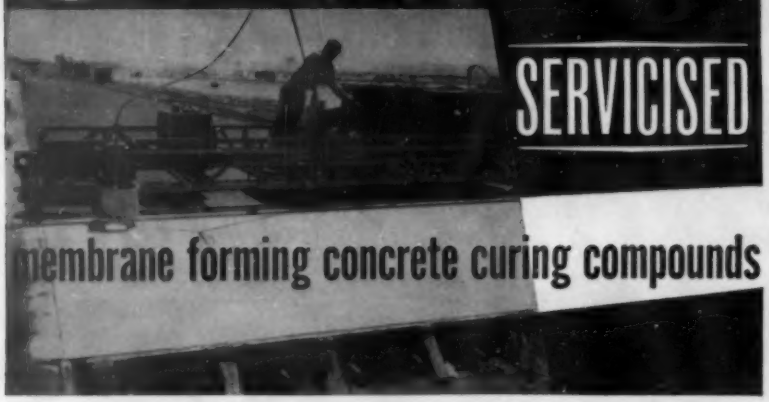
6 reasons for specifying and using SERVICISED membrane forming concrete curing compounds



1. Provide lowest unit of moisture loss
2. Meet official specifications for each particular type
3. Sprayed or painted on vertical surfaces, they will "stay put"
4. Save time, labor, material
5. Will not cake in the drum
6. Guaranteed uniform quality and results

WHITE PIGMENTED TYPE Servicised White Pigmented Curing Compound provides a film or membrane capable of reflecting heat. It is widely used in areas where atmospheric temperatures exceed 80°F., and properly applied, will reduce concrete temperatures approximately 15°F. Excessively high temperatures during the early hardening period tend to jeopardize setting of concrete and reduces its final strength. High quality inert pigments added to the basic compound also prevent too thin or uneven coverage, as improper application is readily seen. Used on all U. S. Engineers work.

CLEAR TYPE Servicised Clear Curing Compounds are available in both Wax-Resin and Resin Base Types. Only pure synthetic resins are used with carefully controlled proportions of oils and waxes, etc., in a petroleum solvent to insure a clear, impermeable membrane. Both types can be supplied with a fugitive dye which materially assists in securing proper coverage, and which disappears after application.

WAX-RESIN BASE. A general purpose compound, usually used on mass concrete, pavements. Has excellent water retention properties, allowing slow curing of the concrete which eliminates checking. Dries rapidly and forms a film of uniform texture.

RESIN BASE. Recommended for buildings, offices, architectural concrete, etc. The pure resins, oils and other ingredients present a clear film which does not materially alter the appearance of concrete and it permits early application of adhesives, paint, etc.

AIR ENTRAINING AGENT Servicised Air Entraining Agent is a highly active, homogenous and clear solution. A relatively small quantity produces maximum air dispersion, yet it is not so critical as to create wide fluctuations in the amount of entrained air should slight variations in the amount used occur. It will not settle out in storage or gum the dispenser, and its action is not jeopardized by the presence of Calcium Chloride. Servicised Air Entraining Agent meets all official specifications, comes ready to use and requires no additional ingredients or treatment before being used. Available in 5 gallon and 55 gallon drums.

Write for special circulars on Curing Compounds and Air Entraining Agent

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New Publications

(Continued from page 32)

STUD WELDING MANUAL. Tips for design engineers on how to take full advantage of the inherent savings possible with stud welding are among the features of a new 24-page design manual now available from the Nelson Stud Welding division of Gregory Industries, Inc., Lorain, Ohio.

The manual contains full descriptions and physicial properties of the various stud types including the new standard "CP" stud which is recommended for the large majority of applications where a straight threaded stud is required. Manual sections of special interest for designers are those discussing stud selection, counterbore and countersink dimensions for accommodating weld fillets, recommended thicknesses of steel on which studs are welded, and stud locating procedures including template design.

FEDERAL POLICY ON TOLL ROADS. Since the first federal-aid dating from 1916, the statutory policy of the federal government has prohibited federal-aid funds from use on toll road construction. This policy was reviewed but not changed during the passage of the 1956 Highway Act, but the act includes two sections (113 and 114) of significance to the future policy of toll roads.

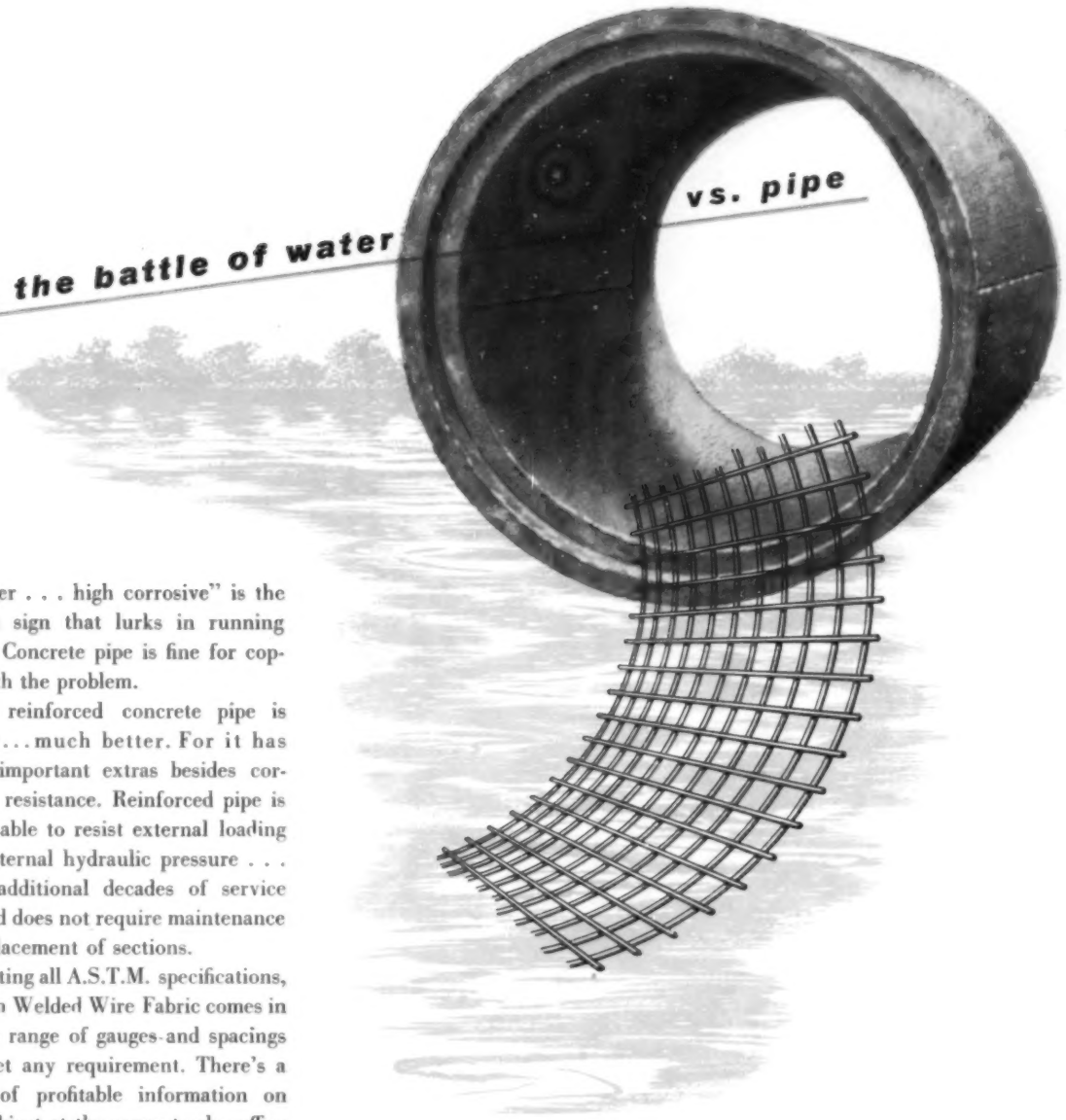
These circumstances are reviewed in detail in this pamphlet prepared by the National Highway Users Conference, Inc., Yule Fisher, research counsel, National Press Building, Washington 4, D.C. Copy available upon request.

HIGHWAY RESEARCH REVIEW. A summary of national activities in highway research throughout the United States is compiled in Research Review 4A, as published by the Highway Research Board, 2101 Constitution Avenue, Washington 25, D. C. Lists research projects in progress or reported recently by state highway departments, federal bureaus, colleges and universities and other agencies.

RUBBER IN ROADS. A 28-page booklet on this subject covering highways in England built with rubber in asphalt has been published by The Natural Rubber Bureau, 1631 K Street, N.W., Washington 6, D.C.

CLINTON WELDED WIRE FABRIC

for the battle of water vs. pipe



"Danger . . . high corrosive" is the hidden sign that lurks in running water. Concrete pipe is fine for coping with the problem.

But reinforced concrete pipe is better... much better. For it has other important extras besides corrosion resistance. Reinforced pipe is better able to resist external loading and internal hydraulic pressure . . . gives additional decades of service . . . and does not require maintenance or replacement of sections.

Meeting all A.S.T.M. specifications, Clinton Welded Wire Fabric comes in a wide range of gauges and spacings to meet any requirement. There's a mine of profitable information on the subject at the nearest sales office listed on the other side of this page. Call soon.

WHEN THEY ASK...

"is it Reinforced"

SAY YES... WITH CLINTON WELDED WIRE FABRIC

THE COLORADO FUEL AND IRON CORPORATION: DENVER • OAKLAND • NEW YORK

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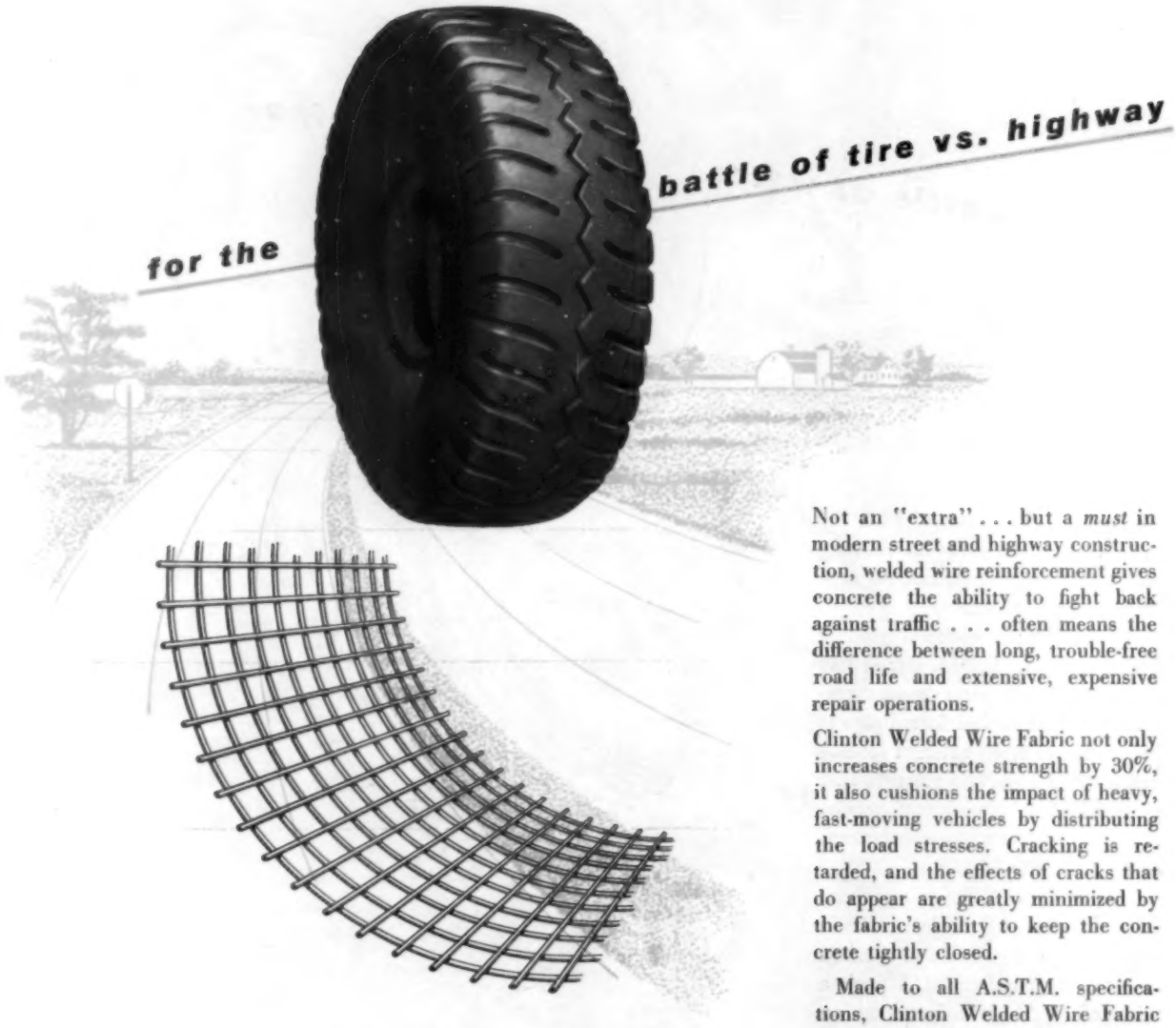
CLINTON WELDED WIRE FABRIC



Not an "extra" . . . but a *must* in modern street and highway construction, welded wire reinforcement gives concrete the ability to fight back against traffic . . . often means the difference between long, trouble-free road life and extensive, expensive repair operations.

Clinton Welded Wire Fabric not only increases concrete strength by 30%, it also cushions the impact of heavy, fast-moving vehicles by distributing the load stresses. Cracking is retarded, and the effects of cracks that do appear are greatly minimized by the fabric's ability to keep the concrete tightly closed.

Made to all A.S.T.M. specifications, Clinton Welded Wire Fabric comes in a wide range of gauges and spacings. For full information, contact our nearest sales office.

WHEN THEY ASK...
"is it Reinforced"
SAY YES...WITH

CLINTON
WELDED WIRE FABRIC
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DW15s BOOST PRODUCTION FOR STRUNK BROS., CATERPILLAR USERS FOR 18 YEARS!

Strunk Bros. of Tiskilwa, Illinois, started in business 18 years ago with Caterpillar-built equipment. The company has good reason for keeping its spread all Caterpillar. Here's why: these rugged yellow machines have meant money-making performance to Strunk Bros. And excellent service from the Caterpillar Dealer has kept the machines on the move.

On this job on Federal Aid Rt. 168, Putnam County, Strunk Bros. is using four DW15s with Scrapers, four D8 Tractors, one D7 Tractor and two No. 12 Motor Graders. The job involves 103,507 cu. yd. of earth excavation and 120,642 cu. yd. of borrow excavation. Owner Harry Strunk says CAT* machines boost production, are economical on fuel and have little down time.

Now a new DW15 (Series E) Tractor with new No. 428 LOWBOWL Scraper

No matter how good a job a machine does, Caterpillar engineers are constantly looking for ways to improve it. And, the new model is *not* made available until it has been thoroughly job tested. That's the story behind the new DW15 (Series E)-No. 428 LOWBOWL Scraper. It's ready. The DW15's engine delivers 200 HP (maximum output capacity). With speeds up to 37.2 MPH, plus the extra sure-footedness of four wheels, the DW15 gives you faster hauls and cycle times with greater safety. The No. 428 Scraper has a capacity of 13 cu. yd. struck—18 cu. yd. heaped—and it loads quicker and more easily because of LOWBOWL design.

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Your Caterpillar Dealer will gladly demonstrate the new DW15 and show you how it can pay off for you!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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ONE GOAL: To concentrate our capabilities, resources and experience on the design, manufacture, distribution and service of job-tested heavy equipment.

THE LATEST, MOST COMPLETE INFORMATION ON THE NEW HIGHWAY PROGRAM — FREE

Here in one booklet is *all* the latest information on the new highway program. Find out how, where and when the money will be spent; standards for the new freeways; final routes of the Interstate System. Everything you need to know to share in the greatest construction job in history.

Dept. RS-8, Caterpillar Tractor Co.
Peoria, Ill.

Please send me immediately ..... copies of "The Road Ahead."

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Company.....

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4 SPEEDS REVERSE

SELF PROPELLED

PNEUMATIC TIRED ROLLER

LEADS the FIELD

ON ASPHALT
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YES! BMCO IS WAY OUT FRONT

- 4 speed Forward — 4 Reverse
- Torque Converter
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- All wheels oscillate — insures better tire wear and more even compaction.
- Hydraulic reversing unit

See Your **BMCO** Dealer For
A Demonstration Today!

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Regulations for Contracts and Wages on Interstate Highway System Jobs

Here is a handy abbreviated restatement of contract stipulations and enforcement procedures set forth in new regulations applicable to initial construction on the Interstate highway system. The summary, issued by the Ohio Contractors Association, covers a review by the Labor department in the Federal Register.

• *Contract Stipulations.* The new regulations apply a modified version of Davis-Bacon Regulations Part 5 to the Interstate highway program and specify 13 contract stipulations, along the line of the old Regulation 5, for inclusion in Interstate highway contracts:

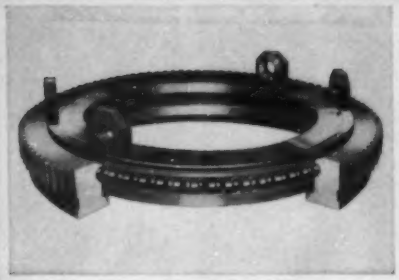
1. Minimum rates will be paid as predetermined by the Labor department.
2. Rates are understood not to include health and welfare fund contributions.
3. Only classifications listed may be used, except with Labor department approval.
4. Payment of rates above those listed will be no basis for contract-price increase.
5. Wages will be paid weekly, unconditionally, and without unapproved deductions.
6. The wage schedule will be posted.
7. State highway departments may withhold contractor funds to insure restitution.
8. Anti-kickback regulations will be complied with.
9. Certified payrolls will be submitted weekly. Agencies, including the Labor department, reserve the right to inspect payrolls at any time and to interview employees during working hours on the project.
10. Only apprentices registered in a bona fide program will be allowed to work.
11. The exact wage predetermination will be inserted into the contract, and the wage predetermination will be regarded as obsolete 90 days from issuance.
12. The contractor will insert these stipulations into all his subcontracts.
13. Breach of stipulations will be grounds for contract termination.

• *Enforcement Procedures.* The new regulations set forth a number of enforcement procedures to put the wage requirements into effect, as follows:

1. The federal agency has responsibilities to insure use of above contract stipulations.
2. The agency head shall furnish names of violators to the Labor department for possible transmission to the Comptroller General for "blacklisting."
3. The federal agency shall check payrolls and affidavits for non-compliance, giving particular attention to correctness of classifications and disproportionate employment of laborers, helpers and apprentices. Records shall be preserved for three years.
4. The federal agency has responsibility to make the necessary investigations.
5. The Labor department may make such investigations as they deem desirable.
6. The federal agency shall report to the Labor department all willful violations and violations over $200 coming to their attention.
7. The agency head shall take action to insure restitution.
8. The Labor department may hold hearings at the request of the federal agency in cases of disputes over prevailing rates or proper classifications, under certain circumstances.

(Note to contractors: Since the items listed in this

(Continued on page 43)

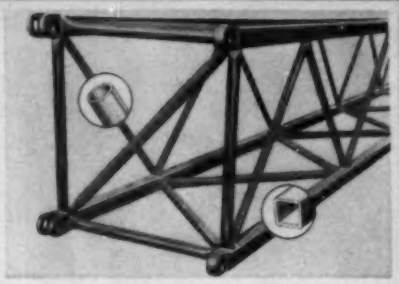


"SHEAR-BALL" TURNTABLE MOUNTING*

Turntable is secured to crawler and revolves easily and freely on a huge sealed "ball bearing." No center pin or nut, centering gudgeon or exposed roller path . . . no turntable rollers . . . no constant adjustment, maintenance or lubrication problems.

2-LEVER, "JOY-STICK" AIR CONTROLS

The newest and most effortless of all shovel-crane power controls. "Metered Air" feeds power to clutches at any rate desired — yet operator retains full "feel" of all operations. Fewer levers, fewer motions, faster, smoother, less effort, less fatigue, more output.



SQUARE-TUBULAR-CHORD BOOM*

This new patent-applied-for design has startling advantages over conventional types. Reduces weight and increases lifting capacities. 30-ton crane capacity on 14-ft. long x 13-ft. wide crawlers . . . up to 100-ft. boom, plus tip extensions available.

**U.S. and foreign patents applied for.*

In the LORAIN-56 too the BIG 3 make money for you!

Just like the big 2½-yd. Lorain-85A, the fully convertible 1¼-yd. Lorain-56 gives you the 3 big Lorain features that will mean more profits on any job. You get greater operating ease, longer life, higher production, reduced maintenance . . . plus increased crane capacities with these "Big 3" features.

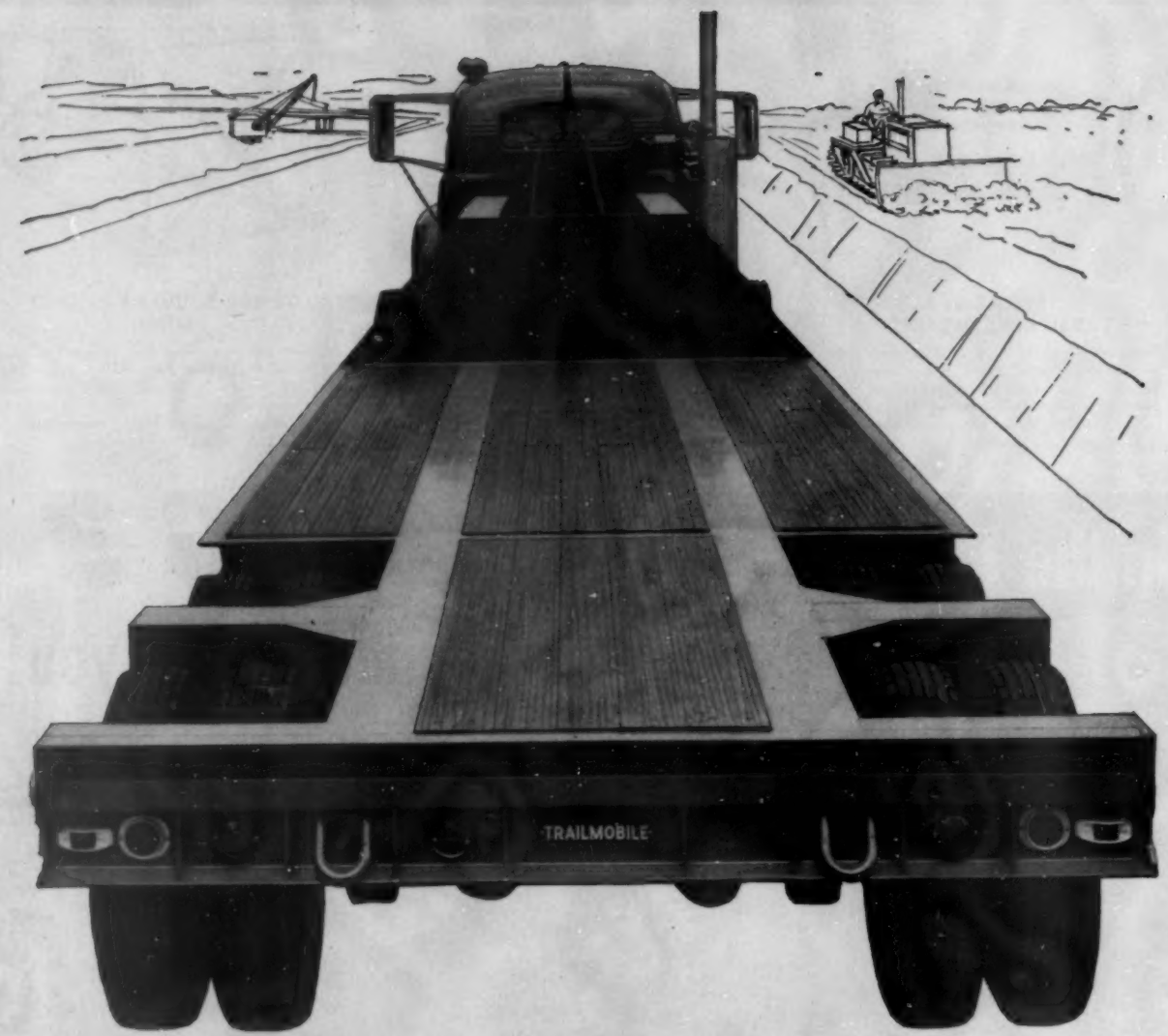
There are many other "56" advantages, too, that make it an exceptional value in the 1¼-yd. class. Here are a few: full air control of crawler operations . . . hoist and swing drums and travel shaft on anti-friction bearings . . . torque converter power-take-off . . . choice of two crawlers . . . crane capacities up to 30 tons available . . . a new, interchangeable hoe with dipper widths from 36" to 48" . . . and there are many more.

We would like you to know *all* about the Lorain-56. Why not see your nearby Lorain Distributor now—or write direct for the information you need.

THE THEW SHOVEL CO., LORAIN, OHIO

MANUFACTURERS OF POWER SHOVELS, CRANES, CLAMSHELLS, DRAGLINES AND HOES—ON CRAWLERS, RUBBER-TIRE MOTO-CRANES OR SELF-PROPELLED CARRIERS—EXCAVATORS, ⅜ to 2½ YDS.—CRANES, 7 to 75 TONS

THE THEW LORAIN®



How much weight will a Trailmobile low bed carry?

☐ 20,000 lbs. ☐ 40,000 lbs. ☐ 60,000 lbs. ☐ 80,000 lbs. ☐ 150,000 lbs.

Regardless of which weight you checked, you're right—because Trailmobile builds a low bed trailer for payloads in every weight class. Five versatile models feature massive, sturdy frames that are built to strength standards far exceeding normal requirements.

All units are available on convenient financing and factory service facilities are offered in 53 cities from coast to coast.

TRAILMOBILE INC.

Cincinnati 9, Ohio, Berkeley 10, Calif., Springfield, Mo., Longview, Texas
Sales and Service from Coast to Coast

For complete information check your nearest Trailmobile sales office or use the coupon.

TRAILMOBILE INC. • 31ST & ROBERTSON • CINCINNATI 9, O.
Please send me complete information on Trailmobile Low Bed Trailers.

Name_____
Company_____
Street_____
City_____ State_____

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INTERSTATE CONTRACTS

(Continued from page 40)

summary are very abbreviated, the full text should be consulted for a complete understanding of each item.)

• *Prevailing Rate of Wage.* (a) Application of Davis-Bacon Act—The Secretary of Commerce shall take such action as may be necessary to insure that all laborers and mechanics employed by contractors or subcontractors on the initial construction work performed on highway projects on the Interstate system authorized under section 108 of this title shall be paid wages at rates not less than those prevailing on the same type of work on similar construction in the immediate locality as determined by the Secretary of Labor in accordance with the Act of August 30, 1935, known as the Davis-Bacon Act (40 U.S.C., sec. 276-a).

(b) Consultation with State Highway Departments; Predetermination of Rates—In carrying out the duties of the foregoing subsection, the Secretary of Labor shall consult with the highway department of the state in which a project on the Interstate system is to be performed. After giving due regard to the information thus obtained, he shall make a predetermination of the minimum wages to be paid laborers and mechanics in accordance with the provisions of the foregoing subsection which shall be set out in each project advertisement for bids and in each bid proposal form and shall be made a part of the contract covering the project.

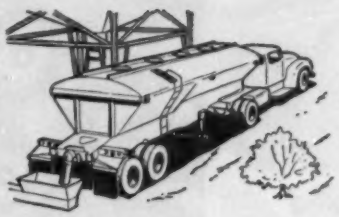
AGC Gives Contractors' Credit Requirements to Administrator

The following letter with regard to contractors' credit requirements was recently sent by the Associated General Contractors of America to Bertram Tallamy, Federal Highway Administrator and to A. E. Johnson, Executive Secretary of the American Association of State Highway Officials:

"The financing of contractors' operations in the execution of the expanded highway construction program is of serious concern to the members of this Association. The Highway Contractors' Division, meeting during our 38th Annual Convention, Washington, D. C., March 11-14, 1957, discussed at length the probability of extensive

(Continued on page 48)

There's a Trailmobile trailer for every construction need

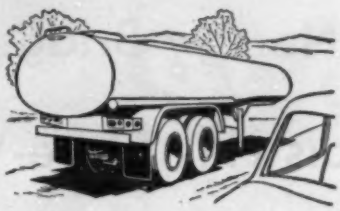


TRAILMOBILE CEMENT BULKERS

. . . transport large amounts of bulk cement to mixing plants at the job site. Both steel and aluminum types offer exclusive step-down design with twin screw discharge.

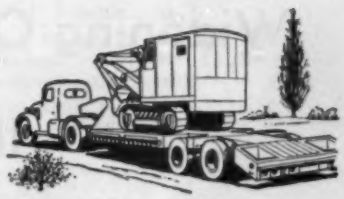
TRAILMOBILE HYDRAULIC DUMPS

. . . provide big capacity in a dump-type trailer for hauling and unloading sand and gravel. Unusually rugged construction guards against costly out-of-service time.



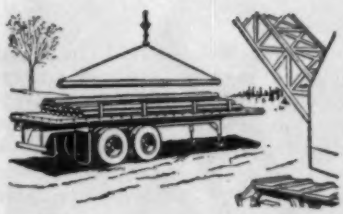
TRAILMOBILE TANK TRAILERS

. . . are widely used for hauling hot asphalt, road oils, and the great volume of water required at the site. Most units carry a unique guarantee against tank leakage.



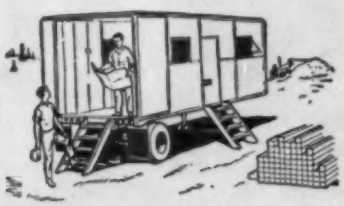
TRAILMOBILE LOW BEDS

. . . are used to deliver heavy road building equipment to the job area. Steel shovels, bull dozers and other large tractor-treaded units can be easily transported on these powerfully built trailers.



TRAILMOBILE PLATFORM TRAILERS

. . . are used for carrying lumber, cement forms, drainage tile, straw bales and sundry light equipment. "Sideless feature" permits simpler, faster loading and unloading.



TRAILMOBILE FREIGHT VANS

. . . combine weather protection and mobility for hauling general supplies. Low cost used vans provide ideal job site offices, tool shops or storage facilities.

TRAILMOBILE INC.

Cincinnati 9, Ohio, Berkeley 10, Calif., Springfield, Mo., Longview, Texas
Sales and Service from Coast to Coast

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Before Single-span reinforced concrete girder bridge on state route 11 near Altamont.

After Bridge has been widened, with new type railing replacing old.

Widening Old Narrow Bridges

Illinois Has State-Wide Program

Over 100 bridges have been widened recently and 70 more such jobs are slated in this year's program. Here are a few highlights.

By R. R. Bartelsmeyer
Chief Highway Engineer of Illinois, Springfield

A comprehensive program of bridge widening is in progress in Illinois, as an important step in increasing the safety and traffic capacity of the state highway system.

Practically all of the bridges which were constructed in the 1920's under the two State Bond Issue Acts were built with roadways which ranged in width from 20 to 24 ft. between side rails. A 6-in. curb on each side cut another foot from the roadway. As pavement lane widths were increased from 9 ft. to 10 and then 11 ft., and now 12 ft., these old bridges became dangerous bottlenecks in the traveled way. Widening of the pavements necessitated widening of the structures. Many of the old structures are deteriorated to such an extent that rehabilitation would be uneconomical. But a considerable number are found to be sound in both substructure and superstructure, especially in the conventional type of reinforced concrete slabs and reinforced concrete deck girders. During the past three years over 100 such structures have been successfully widened. On our 1957 program about 70 structures are scheduled to be widened.

The criteria followed for planning the widening of existing structures are as follows:

(a) The existing structure is first investigated hydraulically, to determine if the waterway opening provided is sufficient for the frequency discharge called for by the Road Classification.

(b) The structure is investigated for strength in accordance with the AASHO Inventory Ratings.

(c) If the existing bridge has sufficient waterway opening, and live load capacity is equal to or greater than H-15, it is deemed satisfactory for widening providing its physical condition is sound.

(d) No attempt has been made to widen existing steel truss spans. The superstructure on this type bridge, is removed and the existing substructure is utilized, if physically sound, to support a new deck type superstructure.

(e) Reinforced concrete through girders are not considered adaptable for widening. The superstructure is removed and the substructure widened to accommodate a new deck type.

• *Typical Procedures.* On existing reinforced concrete slab-and-deck girder bridges, the old railing, rail base, and curb are removed.

Old Trusses Gone

Old bridge, upper left, over Little Wabash river near Fairfield, which was rebuilt, left, with new deck plate and girders and with sidewalks on both sides of entire length of bridge.

The superstructure is widened to the desired width by utilizing the same type of construction as the original; that is, either concrete slab or concrete girders. During the past year about 20 old reinforced concrete deck girder structures have been widened using precast, prestressed beams in lieu of conventional girder widening.

The abutments are widened in this procedure by removing existing wing walls down to the bridge seat elevation, then constructing an extension to the main wall to the desired width and building new wing walls on new footings. All new walls and footings are tied to the old walls and footings by cinch anchor bolts and dowels.

Piers are widened by either extending the stem and footing or by utilizing a concrete pile bent with concrete cap. Two pile bents are normally used for widenings up to 8 ft. The pile caps or solid pier stem and footing are doweled to the old substructure by cinch anchor bolts.

The cost per square foot of widening runs about the same regardless of the method used. The average costs for the different type of structures are currently as follows:

Concrete slabs widened with slab—$30.50/sq. ft.

Concrete deck girder widened with girders—$28.40/sq. ft.

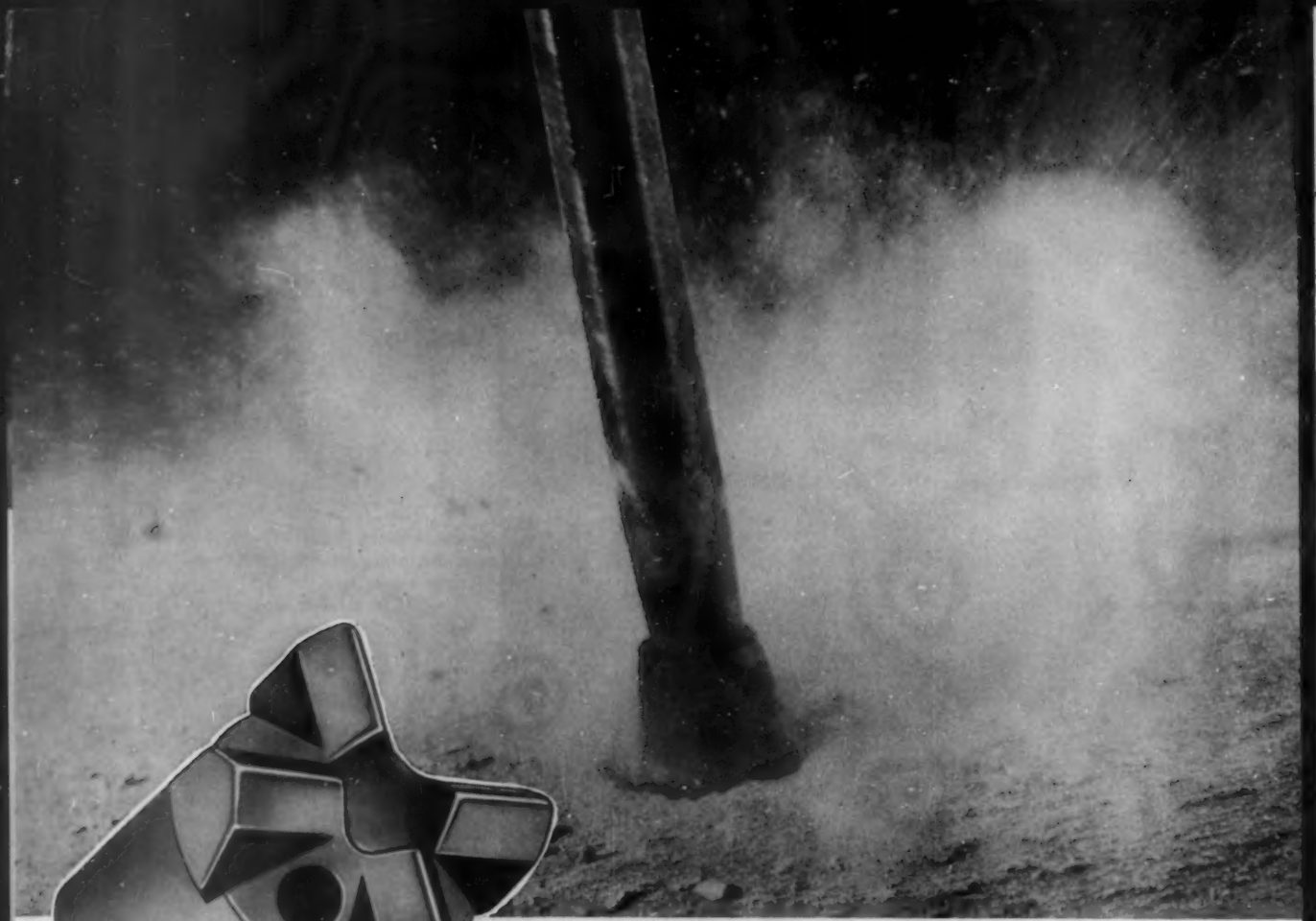
Concrete deck girder widened with prestressed beams—$29.40/sq. ft.

• *How Jobs Awarded.* This work is usually handled in a separate contract from the pavement widening on a specific section of highway. The bridge widenings are put

(Continue on page 49)

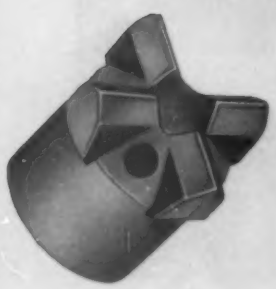
Wingwall Extension

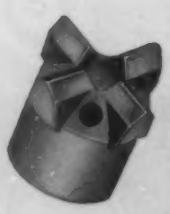
At right, bridge on state route 121 near Scotland with new 30-ft. high wingwalls which were included in the bridge widening. View upper right was taken during construction.



Take a close look...

Le Roi CRD one-use bits save you money 4 ways





1. You drill faster with low-cost Le Roi CRD one-use bits because they have a special offset gauge feature which permits the use of thinner wings, and a steeper reaming angle. Greatly reduced binding, ample clearance for cuttings.

2. You have less drill-steel breakage with Le Roi CRD one-use bits. The method of bit attachment eliminates threads on the drill rod. And since a drill rod is only as strong as the root diameter of its threads, the tapered, *threadless* CRD's give you a stronger, power-saving union, and longer drill-steel life. Other savings result because you also reduce drill-steel handling, and reconditioning costs.

3. You have less wear and tear, too. Rifle bars, rifle nuts, and chucks will last longer because Le Roi CRD's are designed to reduce binding and ease strain on rotation parts of your drills.

4. They cost less, initially. CRD's cost less than 25¢, half as much as comparable multiple-use bits. There's a big saving in time and labor spent handling bits, too. CRD's knock-off, throwaway use eliminates unscrewing, and cuts out all of the time-consuming traffic between operator and bit-sharpening shop.

It costs practically nothing to try them. You don't need to invest in special threading or reconditioning equipment when you use Le Roi CRD one-use bits. Satisfy yourself that they can save you money. Get a can today, and start cutting your drilling costs right away.

AT-77

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

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yours for the asking...

Specialized Counsel on Off-highway Hauling

Having the right trailer to handle the *specific type* of material on *your job* can make a big difference in your profit picture. That's why your Athey-Caterpillar Dealer and Athey offer you the industry's most complete line of haul units — and the service of men with the know-how and experience to help you select the right size and type of trailer.

We'll be happy to work with you — to analyze your job requirements, submit a detailed analysis and an equipment recommendation. You'll find your Athey-Caterpillar field man well-equipped to be of profitable service to you.

He'll help you select the exact trailer size and features you need to gear your job for greatest output. He'll give you facts on the world's most complete line of haulers — rear dump, hydraulic ejection, side dump or bottom dump in capacities up to 45-tons.

They're designed and manufactured by Athey — leader in trailer units for a third of a century!

See your Athey-Caterpillar Dealer today — or fill in the coupon below — for complete details and mail to ATHEY PRODUCTS CORPORATION, 5631 West 65th Street, Chicago 38, Illinois.

Athey

THE *Complete* TRAILER LINE...

by the Leader

Send the coupon for EXPERT COUNSEL

Athey Products Corporation
5631 West 65th Street, Dept. RS
Chicago 38, Ill.

I'm interested — I would like to have an Athey Earthmoving expert call on me — at no obligation.

Name_____

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City_____ State_____

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for Savings - Safety - Speed get a

TARCO "*Scotchman*" for Ice & Snow Control

You can salt-treat your streets and highways *8 times Faster* and *50% Cheaper* with a stainless steel "Scotchman". Your choice of 3 models to use on any dump truck or pick-up . . . no complicated hook-ups. One model gives you One Man Cab Control.

See the NEW and EXCLUSIVE feature *Cartridge Type Power Unit:* engine, impeller, and electric starter is a single compact unit . . . removed or installed in 5 minutes.

More snow control officials use the "Scotchman" for chemical spreading than any other kind! Reasons: It's *Faster*. It's more *Convenient*. It *pays its way* in savings of *Time, Labor,* and *Materials*. Ask your dealer or write for details.

Nothing Saves Like a "Scotchman"

TARRANT Manufacturing Company

25 Jumel Place, Saratoga Springs, N. Y.

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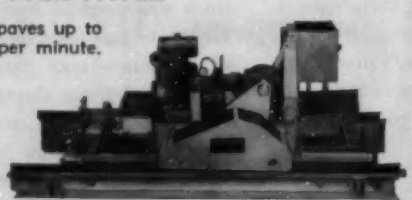
These 3 Remarkable Machines DO A COMPLETE JOB in one operation!

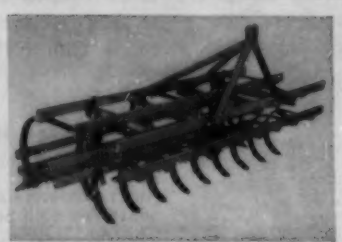
DOTMAR CURB and GUTTER PAVER

Dotmar Curb and Gutter Paver—paves up to 10' of finished curb and gutter per minute. Paves sidewalk too, or integral curb, gutter and sidewalk. Mechanical tamper in front hopper —vibrator on rear hopper. Forward and reverse transmission. Pays for itself in first mile of paving. Hit of the Road Show. Get the facts!



DOTMAR BRUSH & WEED CUTTER

Gear box unconditionally guaranteed. Cuts and chips weeds and brush up to 2" dia. in one operation. Also wheel mounted model.



DOTMAR ROADSIDE SEED BEDDER

Prepares parkway and roadside soil for seeding. Scarifies, grades, harrows, cultivates, levels, rakes in one operation, at one pass.

Makers of Dotmar Air Ace Pneumatic Hammer and Tools

Dotmar INDUSTRIES Inc.

501 HANSELMAN BUILDING KALAMAZOO, MICHIGAN

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CONTRACTORS' CREDIT

(Continued from page 43)

credit requirements. It was the consensus of the group, following those discussions, that credit requirements can be greatly reduced if earlier release of contractors' monies can be obtained.

"We have, therefore, been instructed to forward to you the following recommendations:

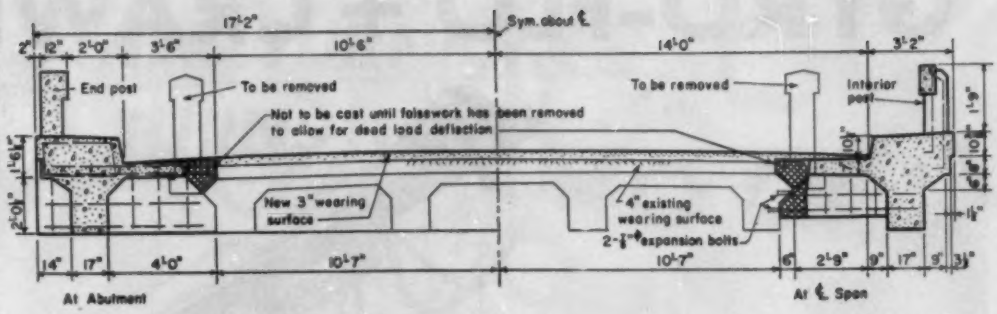
"(1) That contractors be paid full allowance of current quantities on periodic estimates, realizing that the contractor's bond and the customary retained percentage covers any occasional small overpayment, and further recommend that the Bureau of Public Roads cooperate fully in advancing funds where circumstances create overruns during construction.

"(2) That the Bureau of Public Roads and AASHO cooperate in encouraging a uniform policy for the payment for materials delivered to be incorporated in the work; a specifications clause similar to the following be adopted:

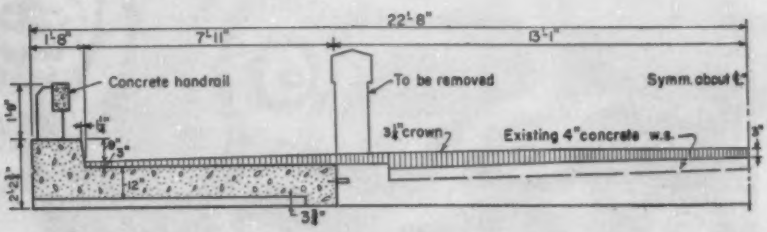
"When a contractor purchases materials which will be incorporated in the work it is proper to pay for the delivered cost of those materials in the first regular progress estimate after delivery and proper storage. It is not proper to make payment dependent upon the time such materials will be incorporated, as market conditions and not the construction schedule may be the governing economic factor. As long as purchase and actual construction maintain a reasonable ratio within the limits of funds available for the contract there should be no restriction on advance purchase of materials. Payments for such materials should be contingent only upon the approval thereof by the engineer."

Contract Award Regulation

The Bureau of Public Roads has issued a new ruling on contract awards. This requires that all necessary right-of-way must be acquired or legally placed at the disposal of the state before the bureau will concur in the award of a contract. For Interstate projects the acquisition of right-of-way shall include acquisition of the right of access to the highway from the abutting property, either by purchase or condemnation. Condemnation proceedings must have been started but need not be completed prior to award.


Sym. about ℄
End post
To be removed
Not to be cast until falsework has been removed to allow for dead load deflection
To be removed
Interior post
New 3" wearing surface
4" existing wearing surface
2-¾"ϕ expansion bolts
At Abutment
At ℄ Span

● **Widening both sides of an existing concrete deck girder bridge with additional poured girder section.**



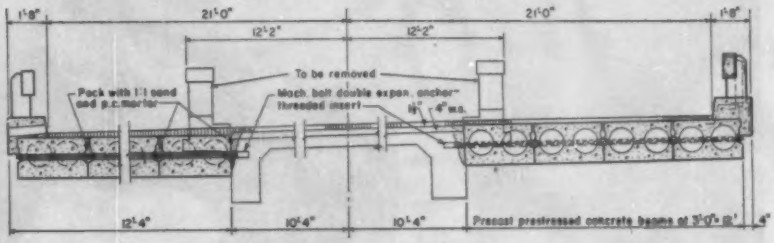
● **Simpler widening job for slab deck. New concrete doweled to old slab by expansion bolts. New style hand rail shown.**

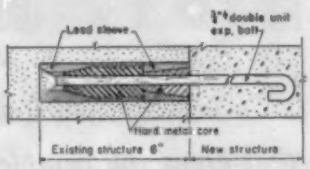
WIDENING OLD BRIDGES

(Continued from page 45)

up for letting, both as singles and in groups, depending on the size of the work and the location of the structure. From two to five structures may be grouped into one contract if they are located within an improvement of five or six miles in length.

A more elaborate bridge modernization project is sometimes found feasible. For example, recently on Route 15 in Wayne County, three truss spans were replaced with a new three-span continuous deck girder structure. The concrete deck girder approach spans were widened with additional girders.





● **Precast, prestressed deck unit, above, used for widening. Also shown, right, is detail of expansion bolt used as tie between old deck and new.**

Site for Road Contractor's Base Brings Protests

A hint of the problems that will face many contractors who undertake large expressway projects in and around cities, is seen in the excitement raised recently by the proposal for a huge contractor operating base near Chicago.

The plant is for a base of operations for construction work on the Illinois State Toll Road through Lake County, fringing on suburban Chicago. Parents of children living in the vicinity protested the construction of the plant, which would be located across the street from an elementary school "in violation of an existing zoning ordinance."

A hearing was held over the situation, which was described in the *Chicago Tribune* as involving 120 trucks which would travel along the roads daily to and from the concrete batch plant at this site. This would be a "peril to the 90 school children, in addition to being a source of noise and dust."

The county zoning officials explained that "there is no question of rezoning the area, but only of whether to grant a building permit." The zoning director pointed out that the plant would be only temporary (two years) for the duration of the project.

"It would be impossible for us to stop the construction of the toll road through the county, although it can be impeded," said H. J. Carlson, the Lake County official. "But in recognition of the necessity for the road, some inconveniences will have to be made." The contractors, G. K. Newburg of Chicago and Hoyle, reported that watchman would be employed during the school hours for the children's protection and that the firm would take the responsibility for oiling the roads to keep down dust.

In protesting the construction, a local citizen pointed out that often when a material plant is set up for a large construction project of this kind, it stays permanently.

New Photogrammetry Service

A complete photogrammetry department, the first of its kind in south Florida, has been established by Rader and Associates, engineers, 111 N.E. 2nd Ave., Miami. Elmore K. Kerkela, former vice president of Abrams Aerial Survey Corp., will head this department, which has been supplied with a Galileo-Santoni Stereocartograph, Model 4.

GYRO-FLO + CRAWL-IR

. . . a highway construction team that gives you completely mechanized drilling power at its RUGGED BEST!

THE new Ingersoll-Rand CRAWL-IR is the most completely mechanized, self-propelled crawler drill ever developed. Boom swing, boom lift, tower tilt, tower swing and tower lift are all hydraulically controlled at the touch of a throttle, permitting faster, easier and safer setups for drilling in any position. And because it tows its own air compressor, even up grades and over rough terrain, you don't have to take other equipment off the job for this purpose.

Teamed up with a Gyro-Flo 600-cfm, it gives you a drilling combination that has no equal for economy and dependability of operation. The famous Gyro-Flo rotary action, thoroughly proved by more than six years of on-the-job service, is your best assurance of low-cost, virtually maintenance-free air power. Ask your IR Distributor or representative for complete information on this pace-setting drilling team.

IR CONTRACTORS' COMBINATION

Ingersoll-Rand 14-612

11 Broadway, New York 4, N. Y.

THE BEST AIR EQUIPMENT FOR BETTER HIGHWAYS

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ANOTHER TURNPIKE TURNS TO CEDARAPIDS

for greater tonnages of low-cost aggregate with the

CEDARAPIDS COMMANDER

As competition gets rougher for the profitable Turnpike contracts, you need a plant that can supply specification aggregate in the schedule-beating quantities demanded . . .

That's the Cedarapids Commander!

You need a quality-built plant which gives you the steady, trouble-free production that increases your take-home pay on each job . . .

That's the Commander!

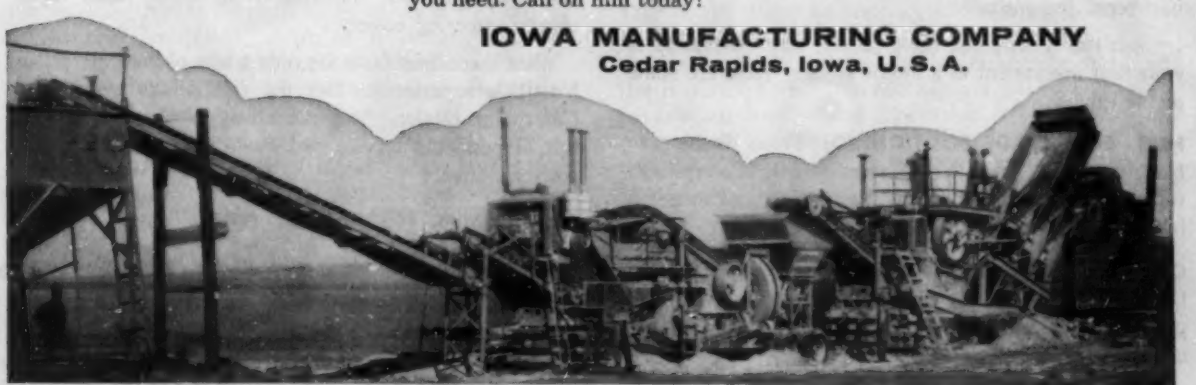
Commander capacity, versatility and low-cost performance are the reasons why contractors bidding and working the big Turnpike jobs turn to Cedarapids.

And if you have special problems to meet, or unusual conditions to lick . . . remember, there's a complete line of Cedarapids Portable and Stationary Plants, both aggregate producing and bituminous mixing, to help you make good money on every job.

Your construction-experienced Cedarapids distributor will gladly explain Commander benefits, or help you select the Cedarapids equipment you need. Call on him today!

Producing aggregate for two contracts totaling almost 1½ million dollars, the Cedarapids Commander teams up with a Cedarapids Portable Primary Plant to make money for Broce Construction Co. of Oklahoma, Inc., of Woodward, Oklahoma.

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.



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NEWEST REASON WHY THE CAT* NO. 12 MOTOR GRADER IS THE "STANDARD OF THE INDUSTRY"

Preco Automatic Blade Control is available only on the Cat No. 12 Motor Grader.

The Caterpillar No. 12 Motor Grader rightfully claims the title "standard of the industry." Yet Caterpillar is constantly seeking—and finding—ways to improve this great machine.

Latest advance is the Preco Automatic Blade Control, shown above, which keeps the blade at any desired slope, regardless of the roughness of the terrain. Accuracy in controlling slopes *within ⅛ inch in ten feet* has been demonstrated.

But this is only one more reason why the No. 12 is your best investment in a motor grader. Here are some of the others:

FAST, EASY BLADE POSITIONING: From ditching to bank cutting is a matter of seconds with Caterpillar's superior mechanical controls. Saves time and means a better job.

CAT DIESEL ENGINE: Time tested through 25 years of Diesel leadership. Clean, economical burning of non-premium fuels. Injection valves and pumps never require setting or adjusting.

EXCLUSIVE OIL CLUTCH: Rate of clutch wear has averaged less than the thickness of a human hair for 1,000 hours of operation. Clutch down time is therefore practically eliminated.

CONSTANT MESH TRANSMISSION: On-the-move shifting is easy and fast because large gears remain in mesh, do not have to be shifted.

MANEUVERABILITY: The No. 12 is unmatched in this department. Oscillating tandem drive makes backing across ditches easy. Leaning front wheels make turns shorter, steering easier.

But these brief facts are only a hint of the Caterpillar No. 12's superiority. Get the full details from your Caterpillar Dealer. You can always count on him for fast, dependable service and quality replacement parts you can trust.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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WANTED—
THE HARD WORK

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● Looking out of the quarry toward the load checking station (hidden in front of trucks). Less than half-mile away, across the river, is seen West Virginia's capitol building in Charleston.

Quarry Site for Road Job

PAYS CONTRACTOR UNIQUE "BONUS"

Quarrying in wooded ravine, in shadow of West Virginia's capitol, turned into strategic site for shopping district. Blast holes drilled by a large tractor-mounted rotary unit. Hauling over busy highway done with strict safety precautions for riverside expressway at Charleston.

A RAVINE back of this highway grading job yielded 800,000 cubic yards of rock and other specification material. And, in so doing, it gave the contractor something of a windfall—a rock-walled amphitheater in which a suburban shopping center is planned.

The quarry site was for a 2-mile segment of the new South Side Expressway, immediately across the river from downtown Charleston, West Virginia. Nello L. Teer Company, Inc., of Durham, N. C., took this job in May of 1956, at a bid price of $2,308,000 covering grading and related items.

The project's location involved several rather unusual considerations. It lies along the bank of the Kanawha river, necessitating a tricky river-side excavation and filling operation. The principal quantities: 244,000 cu. yd. of unclassified, 405,000 cu. yd. of rock borrow, 398,000 cu. yd. of borrow excavation (land pit)—about 1,047,000 cu. yd. of excavation in all, much of it requiring shovels.

A factor in planning was the existence of U.S. 61 immediately paralleling the job. Over-the-road hauling of large yardages was a key operation, since space didn't permit a private haul road from any available rock site, nor was it economically feasible.

A further hauling problem was the need to take

One of a Series on Rock Excavation

● The new South Side Expressway will skirt the Kanawha River into Charleston, seen in distance. Northwest 80D dragline is rehandling material previously bailed out of the river, as part of grading procedure.

● Over 550 quarry loads per day had to negotiate this rail crossing to reach the job. Handicapped veteran served as flagman.

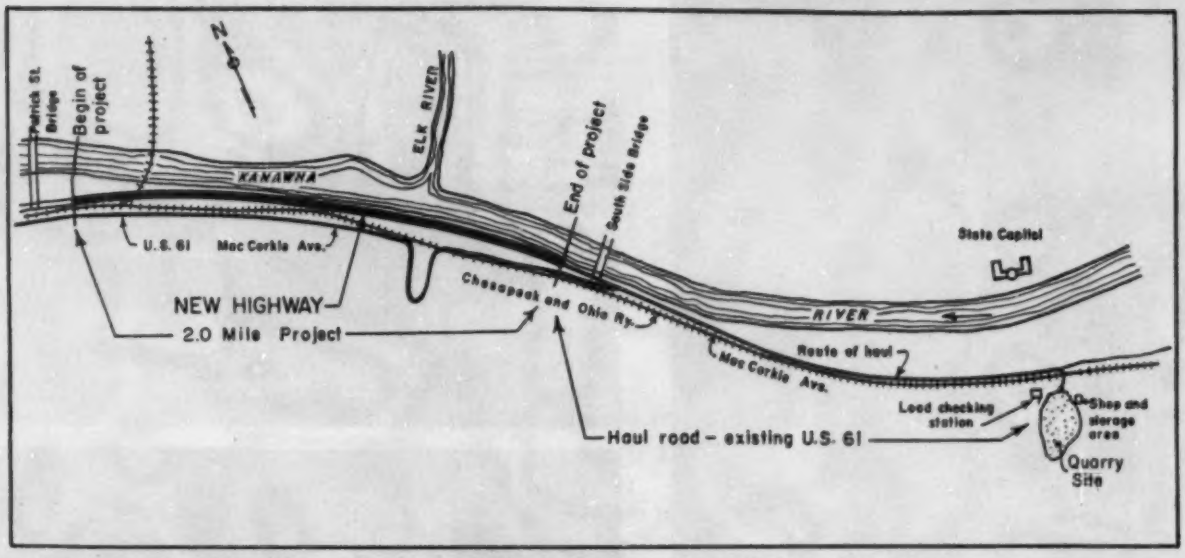
trucks across the Chesapeake & Ohio's double track main line, which also paralleled the project.

● *Ravine Quarry Site.* It isn't publicly known just when the Nello L. Teer firm stumbled onto the idea of making a sideline enterprise out of its rock excavation for this job. But somewhere in their bid preparation, the company's representatives, in scouting for quarry sites at close-in locations, purchased an entire wooded ravine in the bluff back of the job. Besides offering reasonable short haul, it also, in someone's imaginative eye, offered a chance to precipitate a very timely real estate development. This 600-acre site lies immediately across the river from the heart of Charleston, in an area which as yet has remained a wilderness because of the terrain.

At any rate, in quarrying out all this stone and other shovel material, Teer's men widened the ravine so that tree-crowned rock walls surrounded it, and took the floor down in a succession of terrace levels leading toward the hill top. The scheme, from there, and aside from the road project's need, is to build a street on up to the hill top, where a housing site is thus created in beautiful surroundings only 10 minutes from the city's downtown.

The rock was taken out by a pair of Northwest 80D shovels fitted with Esco buckets and Esco teeth

● Some day this quarried-out ravine will be a suburban shopping center. Outlet road in background is the connecting road shown in the layout sketch.



● **Sketch shows location of the quarry site in relation to the job, together with the railroad crossing and the haul of an existing highway, which was a key factor in the job planning.**

● **Rock filling against trimmed bank slope, several feet above water line. Special embankment design required for waterside conditions.**

lays that come from jockeying trucks in and out.

Drilling of blast holes was done by a Mayhew "Hurricane" rotary drill mounted (at the Texas factory) on a Caterpillar D7 tractor. This rig, here pictured, includes several features designed to Teer's specifications. A Gardner-Denver 325 cfm compressor is mounted on the tractor for supplying low-volume air for blowing holes via an elephant trunk. The compressor,

● **Picking off rocks which might later spill on the highway.**

selected for the abrasive sandstone and hard shale. The problems of excavating and filling along the river somewhat set the pace; the shovel work was geared to a delivery of about 550 dump-truck loads per 10-hour day. A conspicuous feature of Teer's excellent management of shovel operation was the stationing of a pitman at each shovel at all times. The pitman's principal work was to spot each truck in exactly the best position for fast loading, without the de-

● **Mayhew "Hurricane" rotary drill, mounted on a Cat D7 tractor, sank over 800 ft. of hole per day.**

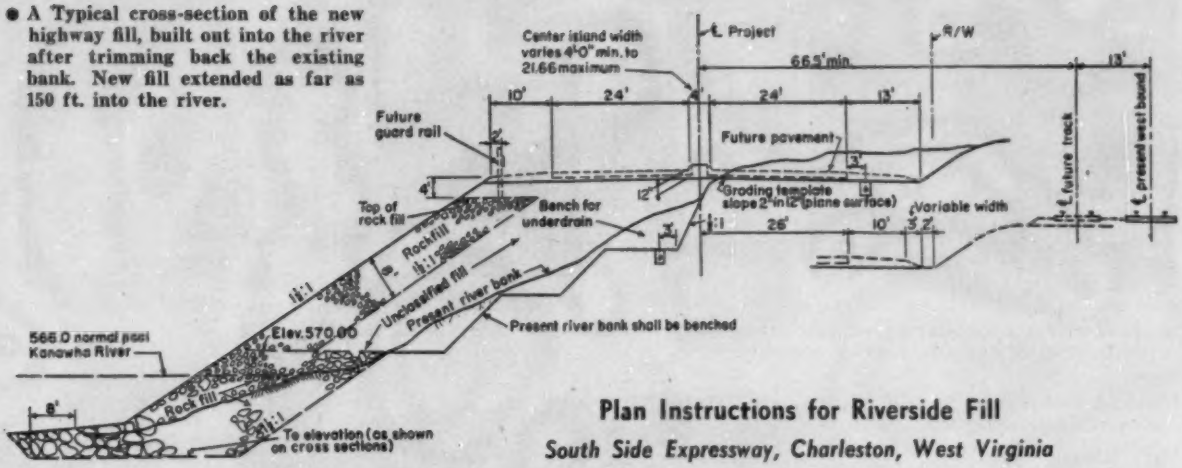
blower, dust collector and the drilling are all done from the tractor engine. The rotary drilling is powered from a take-off directly from the engine transmission.

This rig worked 10 hours days, using two men. Holes were sunk usually 20 ft. deep using "Hole Maker" 4¾ in. rotary bits (made by Oil-Tool Mfg. Co.). A typical day's production in sandstone and shale was 40 such holes, or 800 ft. on a 9 x 10 ft. pattern.

After the men on the site held usual preliminary experimentation with various explosives and charges, the company settled on straight ammonia 40% dynamite, 4"x28", and dividend its purchases between several suppliers. Rockmaster caps were used, and millisecond delay shooting done with 10 delays, working closely with vibration engineers to restrict vibration and yet make the largest feasible shots. This precaution was taken despite the fairly open conditions. Shots of 2,500 to 3,000 lb. were usually possible and complaints were largely avoided. Explosives averaged one pound per cubic yard.

● **This fellow's job was to spot every truck accurately on the first back-in try. Shown here are new International R-190 trucks with Daybrook rock bodies, being loaded by one of the firm's Northwest 80D's.**

● **A Typical cross-section of the new highway fill, built out into the river after trimming back the existing bank. New fill extended as far as 150 ft. into the river.**



Plan Instructions for Riverside Fill

South Side Expressway, Charleston, West Virginia

Where the embankment is toed into the river by means of a rock fill, the trenching and backfilling with rock must be carried on together. At no time shall a trench be opened more than 50 ft.. ahead before backfill is placed. The entire trench opened for its full length must be backfilled to line and grade shown, and up to approximate pool stage before the end of each day's work.

Rock embankment under the water shall be constructed or dumped from the river bank toward the river channel, so that the soft underlying material will be forced to the outside (river channel) and not to the inside (river bank) of the area to be filled.

Dumping for construction of rock fill will only be permitted to elevation 567.0. All rock fill or unclassified fill placed above this elevation shall be formed in layers and compacted as required by the standard specifications. Rock fill and unclassified fill for project's roadway embankment shall be placed and brought to final grade simultaneously.

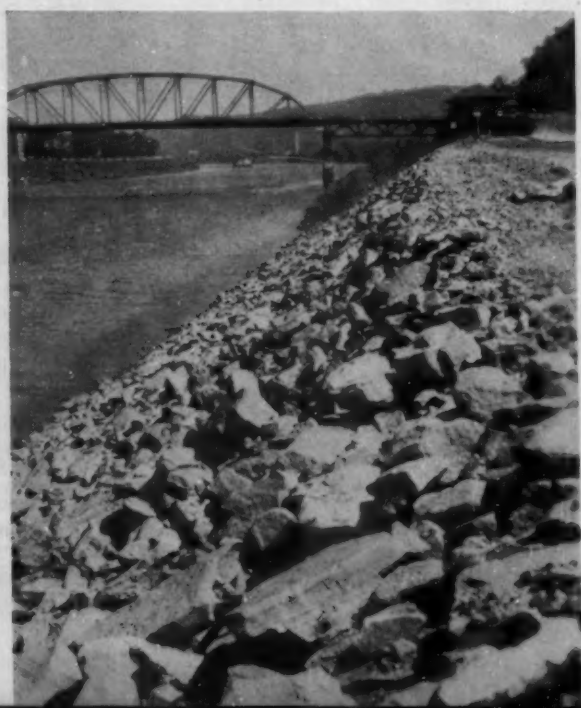
The quarry area at lowest level and nearest to the job was worked first, in order to keep costs at their lowest during the early job phases.

A windfall in the job was the mining of over 4,500 tons of saleable coal in excavating rock and earth borrow.

● *Over-Road Hauling.* Hauling to the job was done with equipment selected and purchased new with the project's particular requirements in mind. Trucks were selected, rather than off-road units, due to the one to three mile haul required over a public highway. The trucks comprised 25 International R-190's, of which 13 were fitted with Daybrook 10-yd. rock bodies, and 12 with dirt bodies of 10-yd. capacity. One of the 80D shovels usually was kept on overburden and other semi-rock materails, working with the dirt trucks. The other shovel worked in hard rock at all times, loading to the rock bodies.

All drivers of trucks, on leaving the quarry, were required to stop at a tally station, where a man waiting on a platform hopped on the load with a shovel and picked off any material piled too high for safe transport over the highway. As a

● **Sheepsfoot roller of 550 psi unit weight used, under specifications which left rolling method to the contractor. Heavy tractor and close coupled single-drum arrangement found best for this job.**



● **Finished section of slope and highway grade.**

● **Littleford explosives storage and cap storage—easily transportable units meeting all safety regulations—part of the safe blasting procedure.**

result of this precaution, the highway remained conspicuously free from spilled rocks, dust and mud—a dangerous condition which has often caused much public irritation and brought complaints on other such jobs. In contrast, newspaper readers have written in, complimenting the Nello L. Teer Company and the highway commission for their care on this project.

● *Flagmen at Crossing.* After the loads have been inspected, the drivers then had to cross the busy C&O tracks to reach the highway. Here a flagman was stationed in cooperation with railroad officials. This man was one of six handicapped people employed by Teer on this job, under a company policy of finding work for such men whenever possible. This flagman, pictured, a veteran with both hands amputated, justified the company's belief that such workers are "tops" when given tasks within their capabilities.

The drivers, following negotiation of the rail crossing, then joined the highway traffic stream and proceeded at controlled speed to the project. The entire over-the-road haul operation was handled without any fancy specifications, but with a definite understanding and cooperation between the contractor and the highway department.

● *Embankment Design.* Since the major portion of the project was river bank construction, the design and construction of the embankment were critical problems. These questions among others were studied:

1. Types of material to be used in the embankment, i.e., rock or soil.
2. Protection of embankment against erosion from the river.
3. Settlement of the embankment, particularly due to the material beneath.

To get facts for design decisions, an extensive drilling program was carried out. Drill profiles were made along the centerline and at the toe of the slope. Also core logs were charted for river-bottom holes. The types of soil as well as the location of bedrock were shown on the profiles.

● **1,000-gallon sprinkler truck—built compactly with rectangular tank for maximum capacity and safe over-the-highway hauls.**

The drilling indicated that a sandy aluvium existed from the ground surface (or riverbed) to rock. The types of bedrock encountered were sandy shales and sandstone, and were not considered of any concern as to foundation quality.

Since erosion was a consideration along the river, a rock face was specified. In addition to requiring rock for the fill up to 4 ft. above water, rock was required for a horizontal distance inward from the fill face for each lift above that height, to a point near the top of the embankment (see accompanying sketch).

The bulk of the material available for filling consisted of shale, soil or unclassified material obtained from stripping the quarry site. The riverbottom material is a firm material, requiring draglining down only a few feet.

(Continued on page 145)

● **Tom L. Horn, Sr., of Kanawha Steel & Equipment Co., with Wm. R. Burton of Nello L. Teer Co., Inc., conferring by Burton's Motorola-equipped car.**

"ONE GREAT PIECE OF EQUIPMENT ...THE NO. 933 TRAXCAVATOR*"

Jim Heron, partner, R. L. Heron & Co.

The job shown here is on a street repaving contract in Los Angeles, California, following the construction of a big storm sewer. R. L. Heron & Co. uses the CAT* No. 933 Traxcavator to handle all its trenching and resurfacing work.

Says Jim Heron: "The tilt and fast bucket action and the oil clutch make this machine the best in its field. We've run a 2,200-foot water trench, three feet wide and nine inches deep, in about six hours with the No. 933. It really serves the purpose of two machines—a digger and a loader. It's one great piece of equipment!"

In any contractor's spread the *new, improved* Caterpillar No. 933 *(Series E)* Traxcavator is a money-making machine. It's fast, maneuverable and easy to move from job to job. It features a new heavy-duty undercarriage with new rugged track roller frame, new solid sprockets, new heavier idlers and new tough track rollers. The one-yard bucket is built for effective digging in tough materials, and the full 40-degree tilt-back at ground level assures full loads without spillage. Fast-acting hydraulic lift controls and high reach speed up truck loading.

Ask your Caterpillar Dealer for a demonstration right on your job. He offers three sizes of Traxcavators—the new No. 933 *Series E* (1 yd.), No. 955 (1½ yd.) and No. 977 (2¼ yd.). And you can count on his reliable service and dependable Caterpillar parts to protect the long work life of the machines he sells. See him today.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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WANTED— THE HARD WORK

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WASHO Keynote:

Strong Road Departments Needed

Sense of urgency pervaded recent Western highway meeting, where speakers challenged state departments to speed adoption of new techniques. Right-of-way chief concern in most states.

THE MEETING of the Western Association of State Highway Officials, held in June at Houston, differed in many respects to previous meetings of this, and other similar groups, in that it had a louder undertone of urgency. Scarcely a speaker failed to mention the shortage of engineering and other personnel, such as right-of-way agents, computer technicians, photogrammetrists, etc.

After the usual welcomes from representatives of the state and the city, Bertram Tallamy, Federal Highway Administrator, discussed the federal highway program. He said that it was "right on schedule" but that complacency could "reverse the gears of progress." He warned that this largest public works program in history, the new $50 billion federal highway program, could be completed on schedule "only if the harmonious relationships between the states and the federal government continue over the next 13 to 15 years." He traced the program during its first eleven months and credited the western states "with a highly impressive showing as a group." "In terms of work actually under way," he said, "contracts have been awarded for 1330 miles of the national system of interstate and defense highways. Of this, nearly half, or 617 miles, are accounted for by the 12 western states" of the WASHO group [includes Texas].

Mr. Tallamy said, "there are many problems besetting the program." Among them he listed the shortage of engineers, occasional shortages of materials, delays in the acquisition of rights-of-way, and financing problems within the states.

W. A. Bugge, Washington state highway director and president of AASHO, called for a strengthening of the state highway departments. "The large amounts of money allocated by the federal government to the states place an especially great responsibility upon state governments," he said. "The state highway departments must continue to be the foundation of the nation's highway construction program, though there may be a temptation for the states to abdicate and let the federal government take the road programs over. If they are to continue to act as that foundation stone, they must continue to face up to their responsibility—take the lead in providing public support, conduct their affairs in an impeccable manner and face up to any need for raising additional state revenue."

Mr. Bugge stated that consulting engineering firms will undoubtedly have to be used but emphasized that the policy among the states should very definitely be to expand the highway departments. In speaking about the shortage of engineers he pointed out that in order to get them, realsitic salary schedules for the beginner and for the man as he advances to higher levels are important, as are hours of work, overtime provisions and retirement systems.

W. E. Willey of Phoenix, new WASHO president

● *W. C. Williams,* chief engineer, Oregon state highway commission, emphasized the importance of creating and maintaining good public relations and of utilizing modern scientific engineering methods such as photogrammetry and electronic computing. He also emphasized that without a competent and loyal staff no administrator can succeed.

L. D. Wilson, chief engineer of the New Mexico state highway department, pointed out that the entire duty of state highway departments is not concentrated on the Interstate system; that other roads and streets must be designed and constructed to replace obsolete or dangerous routes; that local roads must be built to render the best possible service for social and economic development.

R. G. Stapp, construction engineer, Wyoming state highway department, stated that the new program has magnified the problem of the lobbies and pressure groups that want to benefit financially, some with an axe to grind and others only "pushing" their products. "Certain groups of contractors want large contracts so they can utilize their equipment to better advantage," Stapp said, "while another group of smaller contractors want the contracts kept small so they can bid on more jobs. Railroads would like to have the department specify rail shipment for long haul. The trucking industry in turn feels that they should have

SOME MUST BE PAID FOR ACCESS DENIAL

Not all abutting property owners have a vested interest in right of access to highways or streets, noted E. Coleman Gorman, assistant right-of-way agent, Arizona state highway department, and an Arizona attorney.

Discussing the nature and origin of rights of access, Gorman stated that the land has no such access right attached independent of any act or omission of the improvement authority. Its creation depends upon acts of the public; no right would accrue to the land owner until a road was constructed in such a manner as to express or imply the existence of such an access right, he continued. He said that once this has been done the right is an easement by expression or implication and is then, and only then, a real property right that may not be taken or damaged without just compensation and "a day in court."

Gorman said the cases of a rural land owner and a city land owner quite often differ. The city lot owner has a right of ingress and egress due to the manner of the laying out. The streets and their relation to the lots are shown on the plats. This implies that a purchase will perpetually have the free and full use of the street for all proper street uses, he said. The owner paid more for the lot with street conveniences than he would have for the same piece of ground isolated, and the subdivider who laid out the streets could charge more because he furnished the street, so the purchaser actually donated a part of the street, Gorman pointed out at the meeting.

"This is not true in most rural cases," Gorman said, "and the property owner may not be paid for more inconvenience where there is no damage to property. Where conditions are the same, however, both have rights that are measured by the same rules."

all this business as they pay taxes that help finance the program."

Lawrence G. Truehart, right-of-way engineer for the Colorado department of highways, told the conference that "in terms of money, this [program] is the greatest overall real estate transaction in the history of the world. In the first 10 months of the new highway program, the total sum spent for right-of-way has jumped more than five times—compared with recent years—to $321 million, and we are just getting started."

● *In a discussion* of limiting the use of engineers to work that requires engineering training and judgment, Adolph Zulian, engineer of surveys and plans, Colorado department of highways, stated that all of the time-saving ideas and devices now being used are still not nearly enough to meet the requirements of the new program.

In a paper entitled "Administrative and Organizational Revisions in the Oregon State Highway Department to Handle the Enlarged Federal Highway Program," Forrest Cooper, deputy state highway engineer, listed the following major changes as being necessary:

1. Expand the reconnaissance engineering section.
2. Install photogrammetric equipment.
3. Build up and integrate a field estimating section.
4. Install electronic calculating equipment.
5. Expand the urban design section.
6. Centralize the right-of-way description section.
7. Enlarge the preliminary design section of the bridge division.
8. Expand and reorganize the road design section.
9. Add to administrative staff.

Most other state highway departments face these same problems in verying degrees.

Geo. N. Miles, district engineer, Colorado department of highways, said, "In the course of securing highway right-of-way, exercise of the right of eminent domain should be held to a minimum. Under no circumstances should that right be used as a threat. We believe," he said, "that a generous application of the Golden Rule will accomplish more in outright purchases, and gain more in public confidence, than all the sales pressure we could hope to exact."

● Electrocutions from careless use of equipment around power lines is an increasing hazard on road-building work, according to several building work, according to the Corps of Engineers.

New Officers

As officers for 1957-58, the Western Association of State Highway Officials elected the following:

President—William E. Willey, Arizona state highway department, Phoenix.

Vice President—W. C. Williams, Oregon state highway department, Salem.

Secretary-Treasurer—Thurman D. Sherard, Wyoming state highway department, Cheyenne.

Highway Engineer Has Say On "Cut Holiday" Proposal

(Letter in the Milwaukee Journal, May 26, 1957)

To The Journal: If the statement attributed to Gov. Thompson in the Journal, dated May 20, when he endorsed cutting holidays and vacations for state employes and justified it by stating that "Wisconsin is more generous than any other employer," is true, perhaps he is unaware of the following examples of Wisconsin's generosity:

As an engineer with the Wisconsin state highway commission, I am charged with the responsible supervision of construction projects with the monetary value of anywhere from $500,000 and up. Fifty per cent of the contractor's workmen will earn more annually than I will, although performing tasks which require much less over-all skill.

Although the contractor's work force will receive time and a half and double time for overtime, my overtime will be paid on a straight time basis computed after deducting the cost of living bonus, which in effect is four-fifths time.

The three week vacation, which was extended as an inducement to accept state employment in lieu of other higher pay of private employment, is not available to me at a date of my choice. Due to the demand of the construction industry, when other people are enjoying their summer vacation, I am working ten to twelve hours a day, five to six days a week.

—(Unsigned)

Editorial

The Contractor's Over-Highway Hauling

Construction hauling over the highways raises safety problems of serious concern to contractors and roadbuilding agencies alike. The care with which the Nello L. Teer Company has managed its over-the-road transport of rock fill materials, as described in the article on the Charleston, W. Va., project (see page 53), is a model of procedure for such hauling.

Only a few weeks ago a truckload of hot asphalt mix collided with an auto near Duluth, resulting in the death of two people by smothering and burning. There have been other spectacular accidents involving construction hauling on the public highways.

Of greater total concern, in the aggregate, is the prevalence of seemingly minor hazards and general nuisance (mud, dust, noise) from road contractor's operations. Such a "little" thing as avoidance of material spillage, by vigilant inspection of loads, can be made into a form of good will. Highway officials are increasingly specifying such restrictions. Where the precautions are left to the contractor, he will find it profitable to set up his own vigilance, the Teer case suggests.

Such care may cut daily production somewhat. But one or two really bad accidents can wipe out the money gains from "all-out" hauling of heaped loads at whizz-bang speeds. Not to mention a rash of traffic tickets—or the lessening of wear on trucks, truck bodies, dumping hoists and tires.

'Politics' and Highway Engineering Careers

The old excuse given by many state highway leaders that politics hinder them in building roads is a "lot of bunk." This provocative statement was made by a highway administrator, speaking at the recent highway conference held in Atlanta by Georgia Institute of Technology.

The utterance came from W. M. Leech, Tennessee's highway commissioner, who said that, on the contrary, "a better brand" of politics can help to build better roads. He admitted that a higher pay scale for professional engineers would help get more young graduate engineers to cast their lots with the highway departments. But he went on to observe that many of these young people do not accept employment with a state highway department for fear that they would "become subject to political pressure, and that they could not practice their profession without political interference."

"I think it is high time that professional engineers quit talking about getting politics out of the highway departments and begin to talk about instilling into the various highway departments a better brand of politics," Mr. Leech said. "You can no more eliminate politics from highway construction than you can eliminate them in the church to which you belong."

"There isn't anything wrong with politics as such, so long as a majority of the people will take an active interest in these politics and see that doing a good job in a manner which it ought to be done constitutes the best politics," Mr. Leech added.

The Tennesseean cautioned that "the young engineering graduate who thinks that he will only be subject to politics if he takes a job with some governmental agency, is doomed to disappointment when he accepts a job with a private industry, because politics play a part in the management and affairs of private concerns the same as it does with governmental agencies."

The Tennessee road official urged highway administrators to hold fast to location and design standards developed by scientific studies, such as the limited access features of the new Interstate road network. But, he added, those at the administrative level who will direct the big 13-year nationwide road building program are "in all probability going to have some pretty rough going for the next few years."

Briefly Noted...

Contractors who know their costs are very often bitter, and justifiably, over the wild bidding on road work by fellow contractors who seem to want the jobs at any price.

President H. W. Morrison of Morrison-Knudsen Co., Inc., has a favorite story in this connection. He asked a fellow contractor why he was bidding so low and the explanation was "I have all this equipment so I thought I might as well take the work." Morrison's reply was: "You have some money in the bank, why didn't you give them half of that, too?"

M-K, according to its chief, is not going to rush wholesale into highway work under the big federal program unless it can find opportunities for a fair profit. Can anyone ask less than this?

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Be prepared before unexpected storms ice your streets and highways. Eliminate confusion, extra work and accidents by stockpiling Morton Rock Salt now for winter ice and snow removal. Store it in unused buildings, garages, loading platforms or outdoors near key traffic points. You can do this without loss or inconvenience—and, if you wish, a Morton Consulting Engineer will be happy to advise you.

Morton Rock Salt is 8 times better than abrasives. One man and one truckload of Morton Rock Salt does a better job of ice and snow removal than 8 men and 8 loads of abrasives. Morton Rock Salt leaves no messy residue on streets, in gutters and sewers . . . needs no flushing after a thaw . . . won't blow away or leave a rutted, dirty pavement. Non-toxic, Morton Rock Salt also is inexpensive. (It generally costs far less than calcium chloride.)

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Rugged body and frame withstand the impacts of loading, hauling and dumping heavy excavation in construction, mine and quarry service.

More Work-ability and Minimum Maintenance

Designed and built for heavy off-the-highway service, Rear-Dump "Eucs" have paced the field for over 20 years. They've reduced hauling costs on hundreds of the toughest jobs in mine, quarry and construction work . . . delivered "plus" performance year in and year out.

This Model R-18 incorporates the engineering advances, the easy operation and maintenance features, resulting from unequalled field experience with other Euclid Rear-Dumps of 10 to 50 tons capacity. It provides the dependable workability that means more payloads per day at lowest cost per ton or yard moved.

Have your Euclid dealer give you full details on this new 18-ton Rear-Dump and the complete line of Euclid earth moving equipment. He'll be glad to show you why so many users have proved for themselves that ***Euclids are your best investment.***

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

The R-18 is your BEST BET for Lower Hauling Costs!

Advanced design results from 20 years of leadership

Some of the OUTSTANDING FEATURES of the R-18

- **10½ yd. body 36,000 lb. payload**
- **218 h. p.**
- **loaded top speed of 27 m.p.h.**
- **hydraulic booster steering**
- **air assist clutch**
- **free floating springs**
- **16.00 x 25 drive tires**

POSITIVE CONTROL OF DUMPING

Double-acting 3 stage Euclid hoist and hydraulic system gives the operator fast, positive control of the body position at all times. Dumping angle of the body, in fully raised position, is 68°. Body, frame and hoist are designed and built as an integral unit.

SPEED AND STABILITY

The 5 speed transmission and Euclid planetary axle provide a top speed of 27 m.p.h. with full 18 ton payload. Free floating Euclid spring suspension gives maximum stability empty or loaded under all road conditions... permits faster safe travel speeds.

EASY OPERATION

Full width cab offset to left for maximum vision, air assist clutch, booster steering, 218 h.p. engine, fast acting hoist, free floating springs and fully adjustable seat contribute to driver comfort and easy operation.

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

$12 Million Interchange Awarded for Illinois Toll Highway

One of the largest projects of its kind has been awarded by the Illinois Toll Highway commission. The job is for a unique interchange on the outskirts of Chicago, designed to provide rapid, high volume movements between the Tri-State and the north Illinois tollways, and access to and from O'Hare International Airport.

The job went at a low bid of $12,135,670 to a joint venture composed of S. J. Groves & Sons Co., Springfield, Ill.; Arcole Midwest Corporation, Evanston, Ill.; and L. B. Strandberg & Sons, Inc., Chicago.

This contractor group, according to Charles L. Deering, executive director of the commission, tendered the lowest of four bids. The work is for the toll road section known as N-8A which involves a tri-level grade separation structure; 13 access ramps, including three cloverleafs; seven bridges; and a total of 7.59 miles of roadway within an area of 2½ square miles.

This award brings to 149 miles the amount of roadway under construction contract for the toll road. About 36 miles of other work has been advertised or is awaiting award.

The top deck of the structure will carry sweeping ramps permitting vehicles to maintain speed in moving from northbound on Tri-State tollway to westbound on North Illinois tollway, or from southbound on Tri-State to eastbound on North Illinois and the Northwest expressway. These direct-connection ramps can handle more than twice the hourly vehicle capacity of a cloverleaf. Traffic on the top deck will flow on a "left-hand" basis, with a barrier separating the two ramps.

George L. Jackson, chief engineer of the commission, said that the interchange is designed to conform to project construction schedules and to permit completion first of roadway segments providing access between the two tollways. Cook County will build the roadways leading to and from O'Hare airport.

The tri-level structure, of both steel and pre-cast concrete construction, will carry the "left-hand" ramps over both the Tri-State and North Illinois tollways on the top level, Tri-State tollway over North Illinois tollway on the middle level, and the "left-hand" ramps over a cloverleaf to the south.

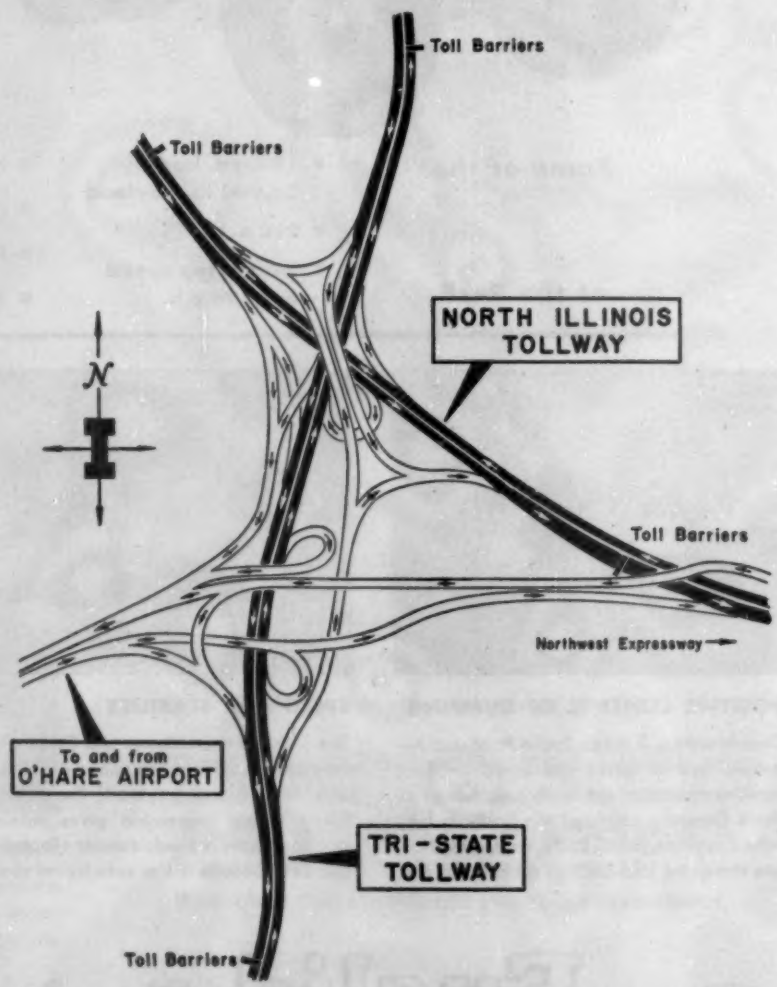
Other structures in N-8A, all of pre-cast concrete, will carry 63rd street over Tri-State, one interchange ramp over another, Tri-State over Higgins road, Tri-State over Devon avenue, North Illinois tollway over Des Plaines river road, and North Illinois over the Des Plaines river.

Fay, Spotfford & Thorndike, Inc., is responsible for design and construction supervision in N-8A under the direction of Joseph K. Knoerle & Associates, Inc., consulting engineers to the Illinois Toll Highway commission.

Plan Pennsylvania "Shortway"

A $265 million trans-state expressway is planned across the state of Pennsylvania. Among the more daring of the state projects unfolding under the new interstate highway program, this 291-mile project will run from the Ohio border to the eastern edge of Philadelphia in the vicinity of Stroudsburg.

The project which is in the planning stage will lie to the north of the Pennsylvania Turnpike and is being advocated by the highway department in lieu of a counter proposal which would include more of the present U.S. Route 6 in the undertaking.



● Proposed interchange for Illinois toll highway near Chicago. Ramps shown are said to out-carry clover leafs.

Phil Dudenhoefer, grade superintendent, knows from production charts that the D9 pusher loads more yards faster, at lower cost.

BEAR IN THE BORROW PIT

THIS D9 LOADS SCRAPERS WITH 25 HEAPED YARDS IN 45 SECONDS

Working on a highway relocation job near Eau Claire, Wis., L. G. Arnold, Inc., cut cycle times and boosted yardage with a Caterpillar D9 Tractor push-loading a CAT* DW21 and No. 470 Lowbowl Scraper.

On a round-trip haul of 3 miles they averaged 100 cu. yd. per hour — 4 heaped loads of 25 cu. yd. each. Loading time in the borrow pit, with the mighty D9 pushing, was an average of only 45 seconds.

Phil Dudenhoefer, grade superintendent for L. G. Arnold, Inc., says: "I've got both feet right in the dirt, where I record output and performance of every machine. With the D9 as pusher, the DW21-No. 470 unit is outproducing by far any other equipment on the job."

That experience has been shared by hundreds of firms, as more and more D9 Tractors have gone to work all over the country. For fast loading you simply can't beat the D9, with its 320 HP at the flywheel and maximum drawbar pull of 98,000 pounds. Power-boosted controls and excellent visibility make this giant one of the easiest of all tractors to operate. Available either with torque converter or direct drive with oil clutch. Maintenance is easy, too. And it's ruggedly built to lick the world's toughest jobs.

Your Caterpillar Dealer can show you actual performance records of bigger production at lower cost per yard. He'll give you a demonstration right on the job. And he stands behind the long life of every machine with reliable service and parts you can trust.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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HEAVY-DUTY EARTHMOVERS FOR THE HARD WORK

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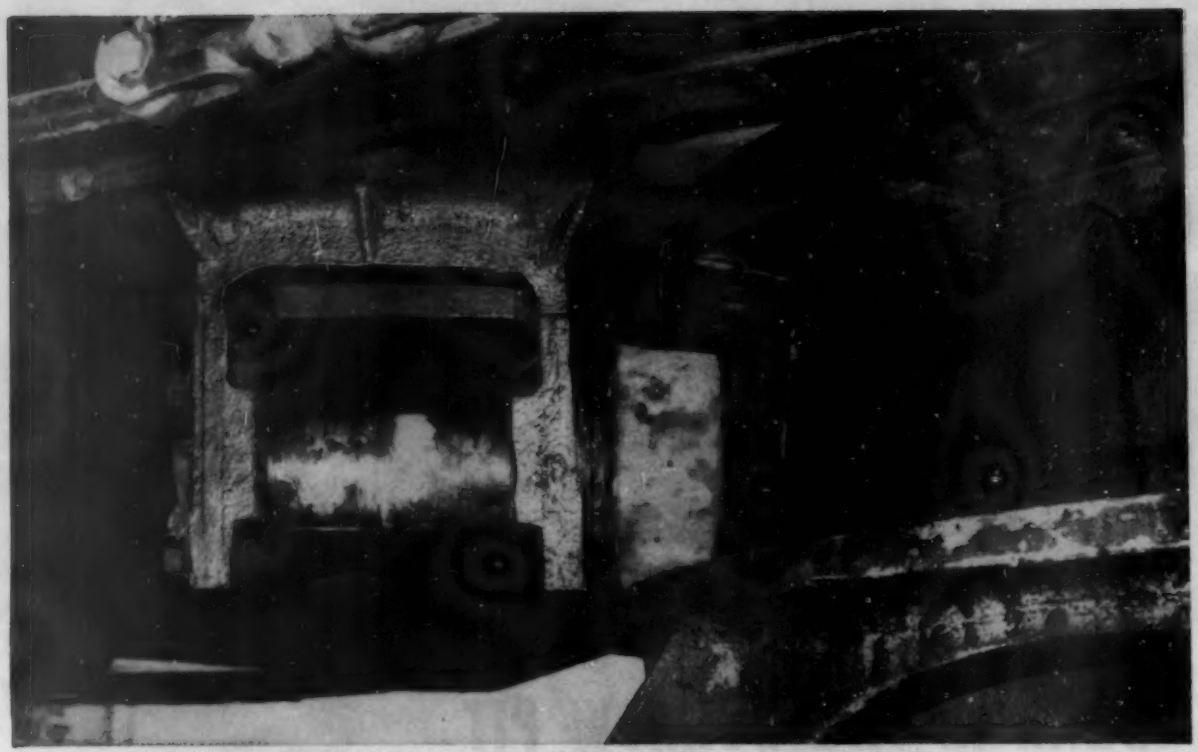


HOUSE ROLLS are automatically built up with 2 or 3 passes of Stoody 104.

How one of the country's large contracting firms MAINTAINS SHOVEL PARTS

The shovel parts illustrated here are typical of those regularly rebuilt and hard-faced by George M. Brewster and Son, Inc., famous for the big jobs handled, such as the New Jersey Turnpike and approaches to the George Washington Bridge. Standard maintenance practice includes complete restoration of worn house rolls, buckets, bucket teeth, pads and tumblers.

After rebuilding, the Stoody 104 deposit is machined to original size. This is one of the few parts requiring machine work. Others go into service "as-welded."

In the Brewster operation Stoody Hard-Facing Alloys are used for both manual and automatic applications. They help to keep equipment in service longer between repair periods and reduce the number of replacement parts that must be stocked. Life of rebuilt parts is invariably equal to or greater than the original equipment—yet the cost of rebuilding and hard-facing is but a fraction of new part costs.

Procedures followed here and by other major earth-moving contractors are described in detail in the Stoody Hard-Facing Guidebook and other Stoody literature; consult your Stoody dealer (see the "Yellow Pages" of your phone book) or write direct for full information.

WORN SHOVEL PADS. Conventional treatment includes rebuilding worn areas with Stoody Manganese and manually hard-facing with Stoody 1027.

OTHER SHOVEL HARD-FACING APPLICATIONS

Besides the applications shown, Stoody Hard-Facing Alloys are regularly used all over the nation for rebuilding and protecting Shovel Idlers, Drive Tumblers, Boom Heels, Latch Bars, Latch Plates, Buckets and Bucket Teeth. Wherever there's wear, you'll find effective prevention with STOODY ALLOYS!

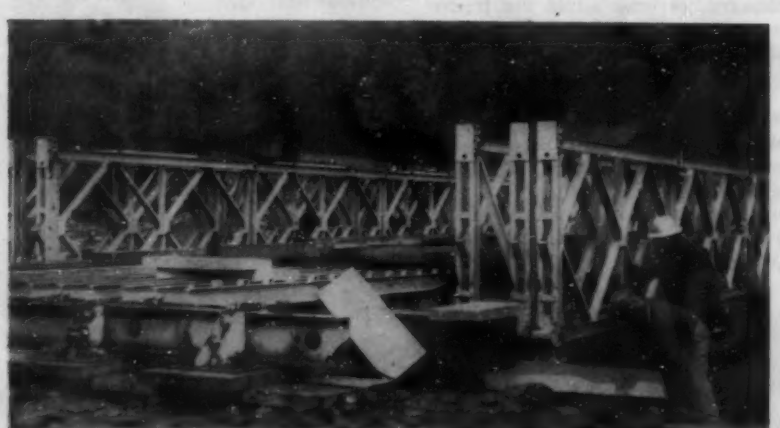
STOODY COMPANY
11925 EAST SLAUSON AVENUE
WHITTIER, CALIFORNIA

. . . for more details circle 344 on enclosed return postal card

Bailey Bridge Still Doing its Stuff

● The Bailey bridge erection job nine hours after starting work. The nose is nearing the far bank during cantilever launching.

● How the job looked 14 hours after work started. The river is spanned and the nose rests on rollers on the far bank.



● Twenty-four hours after the work began. The bridge is seated on bearings and approach ramps placed. Traffic crossed few hours later.

THE BAILEY bridge of wartime fame was put to good use in California during April of the past spring. As pictured here, it spans the Trinity river in northern California, where it enabled the contractors to move heavy equipment across an otherwise inaccessible site for work on the $49 million Trinity dam project.

The bridge consists of an 80 ft. span triple-single M2 Bailey with double transoms for extreme loads. (Loads across the structure are expected to weigh as high as 80 tons.) Deck width is 12 ft. 6 in. at curbs and 14 ft. 3 in. at trusses. Over-all length including approach ramps is 100 ft.

The bridge was supplied by Bailey Bridge Equipment Co. of San Luis Obispo, Calif., and erected by a five-man crew in about 30 working hours.

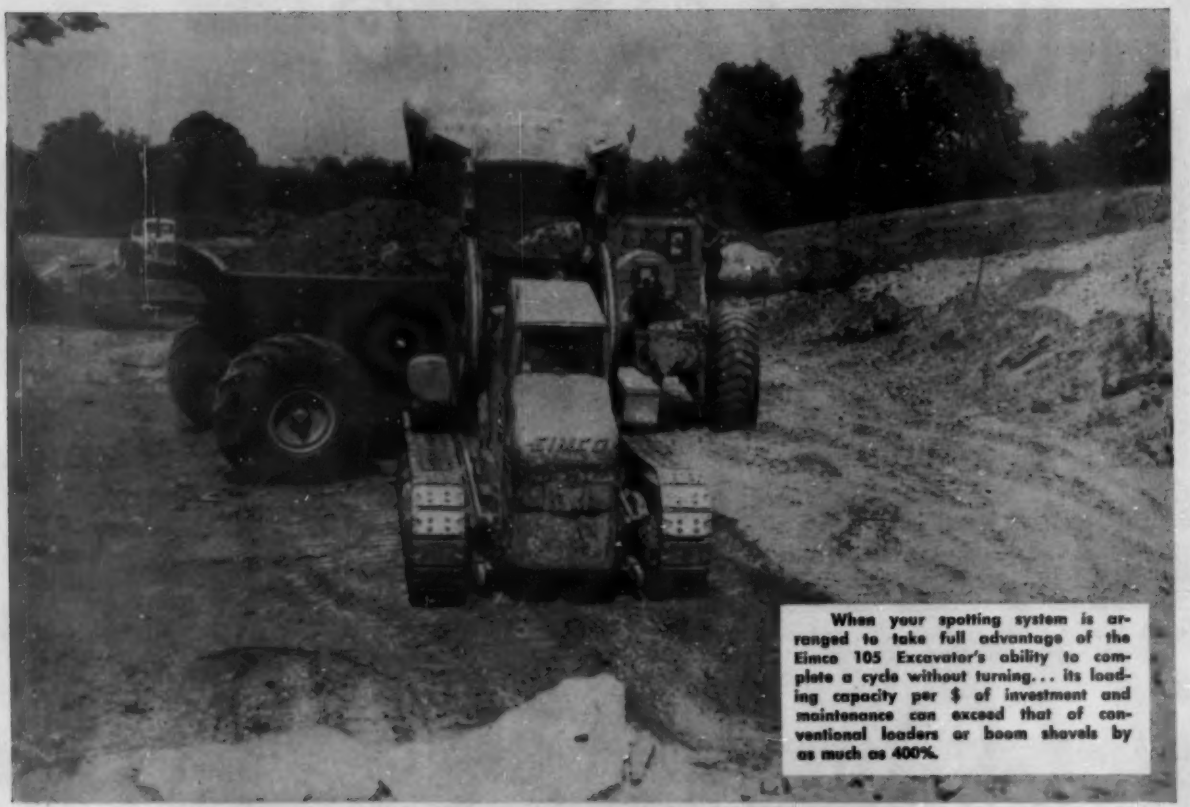
Slate Management Meetings

Two highway management conferences, developed exclusively for highway engineers in administrative positions, will be sponsored next fall by the American Association of State Highway Officials and the National Highway Users Conference.

State highway department heads or their assistants will be invited to attend an executive development conference at the University of Wyoming in Laramie, September 9-14. A management training course for officials in the "second echelon" is again scheduled for September 23-27 at Cornell University in Ithaca, N. Y. It was the success of this latter conference in its pilot run at Cornell last year that has encouraged AASHO and the NHUC to expand the 1957 Highway Management program by having two separate conferences.

Highway officials attending the seminars will discuss such matters of common interest as executive responsibilities, work programs, public relations, budgets, labor relations, planning, personnel training, communications and intergovernmental relations.

The joint endeavor of AASHO and NHUC represents the first and only national training program for highway department administrators.



When your spotting system is arranged to take full advantage of the Eimco 105 Excavator's ability to complete a cycle without turning... its loading capacity per $ of investment and maintenance can exceed that of conventional loaders or boom shovels by as much as 400%.

EIMCO 105 TRACTOR MOBILITY GETS *EXTRA* CAPACITY

Power shifting... operating simplicity... independent track reversal.. forward operating position... low center of gravity... are five important reasons why the Eimco 105 Tractor gets "extra" performance from its overhead or front-end loaders.

EIMCO 105 FRONT-END LOADER
2½ yard... 40,000 lb. break-out

EIMCO 105 EXCAVATOR
1½ yard... Overhead discharge

Eimco Unidrive, power-shift transmission combined with torque converter fluid drive, saves seconds every cycle and eliminates downtime due to burned facings or other clutch troubles. Without taking your left hand from the wheel, you simply manipulate power-shift levers for high, low, forward, reverse while the tractor is moving under full load. There's no reaching, no gear clash, no hesitation.

Independent track reversal is especially advantageous in front-end loading. It permits this 105 to pivot sharply from the muck pile and get material into trucks faster. It gets either loader out of trouble quickly... a big factor on hazardous jobs.

A 105 operator is always "on top of his work". Without standing or "craning" his neck, he can see to attack the muck pile at the best spot for fast loading. This, combined with operating ease, greatly reduces fatigue... gets greater man-hour efficiency.

Low center of gravity gives the 105 tractor extra stability... permits it to traverse 100% grades without tipping.

This combination of extreme tractor mobility and one of two high utility loaders, gives you a wide choice in adapting an earth-moving technique most profitable for your job requirements.

An Eimco Sales Engineer will help you decide which model fits into your job scheme most profitably.

THE EIMCO CORPORATION

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DOUBLE GRAY

is the wire rope that's...

- extra strong
- field proved
- crush and abrasion resistant

Compare Wickwire Double Gray IWRC Wire Rope with the improved plow steel IWRC ropes you're probably using now. You'll see that Double Gray has a rated breaking strength that's 15% greater than the catalog breaking strength of these ropes. And it resists crushing and abrasion better, too. That's because Double Gray is made of *extra* improved plow steel — a new type of rope steel that's being widely praised for its superior strength and toughness.

Yet Wickwire Double Gray Wire Rope gives you even more! Because its makers have long been known for the care with which they make and test their ropes, you know you're getting a safe rope. Like all other Wickwire Ropes, *Double Gray was thoroughly tested both in the laboratory and the field before it was offered to the trade!*

Get the complete story today on how you can best use the extra strength and toughness of Wickwire Double Gray Wire Rope in your operations.

5088

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

CF&I WICKWIRE ROPE A CF&I PRODUCT

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New Orleans • New York • Philadelphia

LOOK FOR THE YELLOW TRIANGLE

. . . for more details circle 270 on enclosed return postal card

BALANCE your tractor fleet

You have two general classifications of tractor work on most every earthmoving project: ① Your concentrated short-haul pushing and dozing, and ② your hit-and-run pioneering, your scattered odd-job assignments, and your clean-up and finishing operations.

Question: Which type tractor — crawler or rubber-tired — will pay-off best on these basically different work classifications?

① For most of your heavy, short-haul work . . . for push-loading large scrapers . . . dozing in slippery mud or rock-filled earth . . . and for "stay-put" work in limited areas . . . your slow-moving track-type tractors fill the bill because they have more lugging power at slow speeds.

② For work where travel range is important . . . for pioneering, leveling scattered fill, towing "part time" scrapers, stockpile clean-up, maintaining haul and access roads, handling finish-grade dozer service, and doing dozens of "chores" scattered over a wide work area . . . your best bet is today's improved 210 hp, 17 mph, rubber-tired Tournatractor®.

Question: How to balance your tractor fleet for maximum profit? . . . How many on crawlers? How many on rubber?

Because every job is different . . . because every project varies in the amount of short-haul, and scattered operations . . . there is no established pattern to follow . . . no fixed percentage that we could recommend. There are contractors who say a tractor fleet should be evenly balanced, half "track" and half "rubber". Others say one in three should be rubber . . .or even one in four. We know owners who have found that one Tournatractor handles the work of two crawlers on their particular operations, and have gone all-out for "rubber". We know, too, that there are some operations where rubber-tired tractors can't work as well as crawlers. So let's be realistic.

Basically, you don't give a hoot for any kind of tractor unless you're convinced it will "pay for its oats" . . . with a comfortable profit margin. Before buying any tractor you will find it to your advantage to study carefully the following phases of your work requirements.

Question: What percentage of work hours do you have for slow, heavy-lugging traction? — What percentage of hours for scattered work, where speed and mobility can save you time, and money?

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Answers to these questions vary in different types of jobs, materials to be moved, work areas to be covered, size of cuts and fills to be worked. No "formula" answer can be arrived at. There is a middle ground where rubber and crawler traction more or less offset each other in advantages, so you don't need to work out an exact formula. Start with a small percentage of rubber-tired tractors where you obviously need the maximum in speed, maneuverability, and mobility. Then extend your rubber-tired percentage as you find it profitable for your operations.

Since crawlers have followed pretty much the same pattern in design and construction for the past quarter century, you are familiar with their use and application. But since heavy-duty, rubber-tired tractors came into extensive use in the earth-moving field only in recent years, there may be operational characteristics about this type of machine which you would like reviewed. Here are a few quick facts about our Model C Tournatractor that may be helpful to you:

210 hp — choice of Cummins or GM diesel engine.

Power-shift transmission, constant-mesh type, with single-stage type torque converter.

Skid-steer, controlled by tractor's big air-actuated clutches.

Tires, 21.00-25, 16-ply rating, standard; wide-base, 26.5-25, 14-ply rating, optional. Choice of Traction or Rock Service treads.

Length — 15'1½", width — 10'6", height, to top of exhaust-stack — 8'11½", wheelbase — 6'0", ground-clearance — 13½", weight — approximately 30,000 lbs.

Advantages:

1. Drawbar and traction to equal crawlers of comparable engine horsepower when working the tractor at speeds above 2 mph.

2. Mobility to move anywhere under its own power. A mile is less than 4 minutes away! And Tournatractor travels twice as fast as crawlers to reach on-the-job assignments . . . to help meet emergencies of job or weather . . . helps step-up production on sections behind schedule.

3. Roadable to travel anywhere. With rubber-tired mobility you eliminate the need for lowboys to haul the tractor to other job sites. You save the cost of extra manpower and equipment.

4. Speed: With power-shift transmission, speeds change instantly,

for extra profit . . .

Four gears forward through standard torque converter, to 17.2 mph; two reverse to 7.2 mph.

Multiple-disc air brakes on all 4 wheels, with 3,762 sq. in. braking surface. Mechanical parking brake.

save as much as 80 minutes per 10-hr. day on dozing or pushing applications. Gear ratio provides effective speed-and-power relationship, with minimum slip and heat in torque converter. Anti-friction drive gives quick acceleration. Without the drag of setting into motion

the 500 or more moving parts in the average crawler linkage, you step right out and GO.

5. Operation of power controls is fast and accurate . . . with simple, time-proven, electric motor-control system. Touch a switch, motor reaches 1800 rpm from standing start in 1/5 second; reverses for full power in 1/4 sec.! There is no pause to "feel-in" clutch, no waiting for hydraulics to build pressure. Action is *instant* and *easy*. Operators "take" to Tournatractor like ducks to water. They like its speed, its quick-stop brakes, its push-button handling.

6. Maintenance: Owners all over the world report their maintenance costs on Tournatractor are ¼ to ½ the cost of crawler maintenance. The reason is obvious:

4 wheels with tires replace more than 500 track parts that wear out and must be regularly replaced.

Because of fewer lube points, Tournatractor cuts daily lubrication to less than one-half the time for a crawler-tractor.

Electric controls vs hydraulics? . . . not much maintenance on either in their present state of perfection.

Parts stock? . . . substantially reduced for rubber-tired tractors as compared to crawlers.

When working toward the proper balance of crawler and rubber tractors for your operations, keep in mind the growing importance of *speed* and *mobility* needed to handle today's bigger and faster dirt-moving jobs *at a profit*. Tournatractors and crawlers can be teamed in proper balance to handle your work at lowest cost . . . using crawlers to "lug" and Tournatractors to "run". On the next 4 pages, read typical examples describing ways your work-and-run tractor-on-rubber balances your heavy-duty tractor operations for maximum pay-off.

Clears right-of-way for production earthmovers — — — →

While your heavy-duty crawlers grub out rocks and stumps, break up shale, and loosen hardpan, there's plenty of widely-scattered pioneering where rubber-tired Tournatractor can save time . . . and get your production haulers started to work earlier. Use this fast-moving machine to pile trees and brush, clear turn-around areas, push aside scattered boulders and debris. Use it to build and maintain access roads, cut drainage ditches, to keep your borrow pits and haul roads dry. Well-maintained haul roads mean faster pay-dirt travel, higher profits.

—more on following 4 pages

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advertisement continued

Handles clean-up around shovels

Two shovels, each working in blasted rock at opposite ends of an 800' cut. Turn-around areas are narrow. Clean-up at both shovels, a problem. To tie-up two crawlers, one at each shovel, is expensive. To transport one crawler back and forth over the hump would be time-wasting, expensive, and hard on the tracks. So you send in one man on one fast, rubber-tired Tournatractor®. Making its own road over the rocky hill, this sure-footed tractor shuttles back and forth fast between shovels, handles all clean-up, has time between runs to do a little land clearing, road maintenance, and drainage. May even have time for other odd-job services that put extra dollars in your pocket!

Quickly reconditions mucky haul road

Your big scrapers, carrying capacity loads, are cutting mucky haul road with deep, slippery ruts that slow production cycles. Tournatractor, pulling 4-drum sheep's foot roller on fill a mile away, is called to drop the pin and get on the job. In 5 minutes the fast, rubber-tired tractor goes to work regrading the damaged haul road. With quick forward passes, and fast reverse, Tournatractor dozes in fresh fill on mucky stretch, levels surface, cuts a trench to improve drainage . . . and production scrapers get back on schedule. Tournatractor returns as often as needed to regrade and drain the mucky road, taking only a few minutes from its regular assignment to keep the big machines hauling at top capacity.

BALANCE your tractor

Repairs access road to isolated farm

Farmer's access road 5 miles down the pike washed out. He can't get his pick-up out to the road, can't move his cream and produce to market. He's mad! He calls your boss, the highway department, he screams. You get word to your Tournatractor operator. He's on the job in 20 minutes. Road is repaired in 20 minutes. Your one-man emergency crew is back on his regular job in 20 minutes. One man, one hour, and the farmer is happy! Next day you patrol the project for other possible wash-outs. Find a few weak spots. Dispatch Tournatractor to make "prevention" repairs. Jobs completed in short time. You've saved money, made many friends.

Stockpiles materials, spreads sub-base

Crushed stone has been unloaded at rail head . . . material must be cleared from tracks, dozed into stockpile 150 ft. away. Tournatractor, banksloping on new highway-cut 4½ miles away, is assigned to job. It arrives in 22 minutes. Big dozer blade averages 2½ cu. yds. per pass. Machine pushes average 150 ft. in 34 seconds . . . returns for new bite in 18 seconds. Tractor heaps material into well-trimmed stockpile for clean storage and easy pick-up by loader. Tractor on rubber then runs to new assignment 2 miles away, where it goes to work spreading crushed-rock sub-base for new highway. There's always plenty of work for Tournatractor . . . plenty of ways it can help to speed up your tractor applications.

pay-dirt travel, higher profits.

–more on following 4 pages

Big 2-ft. wide tires aid compaction

Material on fill is piling up fast. It needs continuous compaction in order not to delay scraper cycles. Tournatractor, pulling 6-drum sheep's foot roller, goes to work. With dozer blade, machine levels high spots ahead as it pulls the 35-ton tandem rollers. Big 2' wide tires add 20-ton compaction in tire tracks ahead of rollers. By making successive passes to lay down tire tracks side-by-side, ground pressure of tires supplements roller compaction very effectively. Valuable time is saved in meeting compaction specifications . . . scrapers continue on uninterrupted schedule. Tournatractor easily pulls multi-drum sheep's foot units or 50-ton rubber-tired compactors. Its ready maneuverability, plus extra speed when needed, makes for orderly scraper spreading at all times. In this, as in many other applications, the speed and mobility of Tournatractor can boost your profits.

Cuts emergency drainage ditch

Rain forecast for tonight . . . could easily flood poorly drained cut in spongy clay, could side-line your production fleet for days. Tournatractor, at work on land-clearing job 2 miles away, is called upon to correct the situation. In 10 minutes, fast-moving tractor is at new assignment, digging emergency drainage ditch, smoothing the cut and haul roads to eliminate water pockets. No production delay today . . . and come heavy rains tonight, the dirt will still roll on schedule tomorrow! This job finished, Tournatractor heads for the next . . . and the next. It's the busiest tool in your fleet, doing a variety of jobs, saving you money, increasing your daily profits.

fleet for extra profit . . .

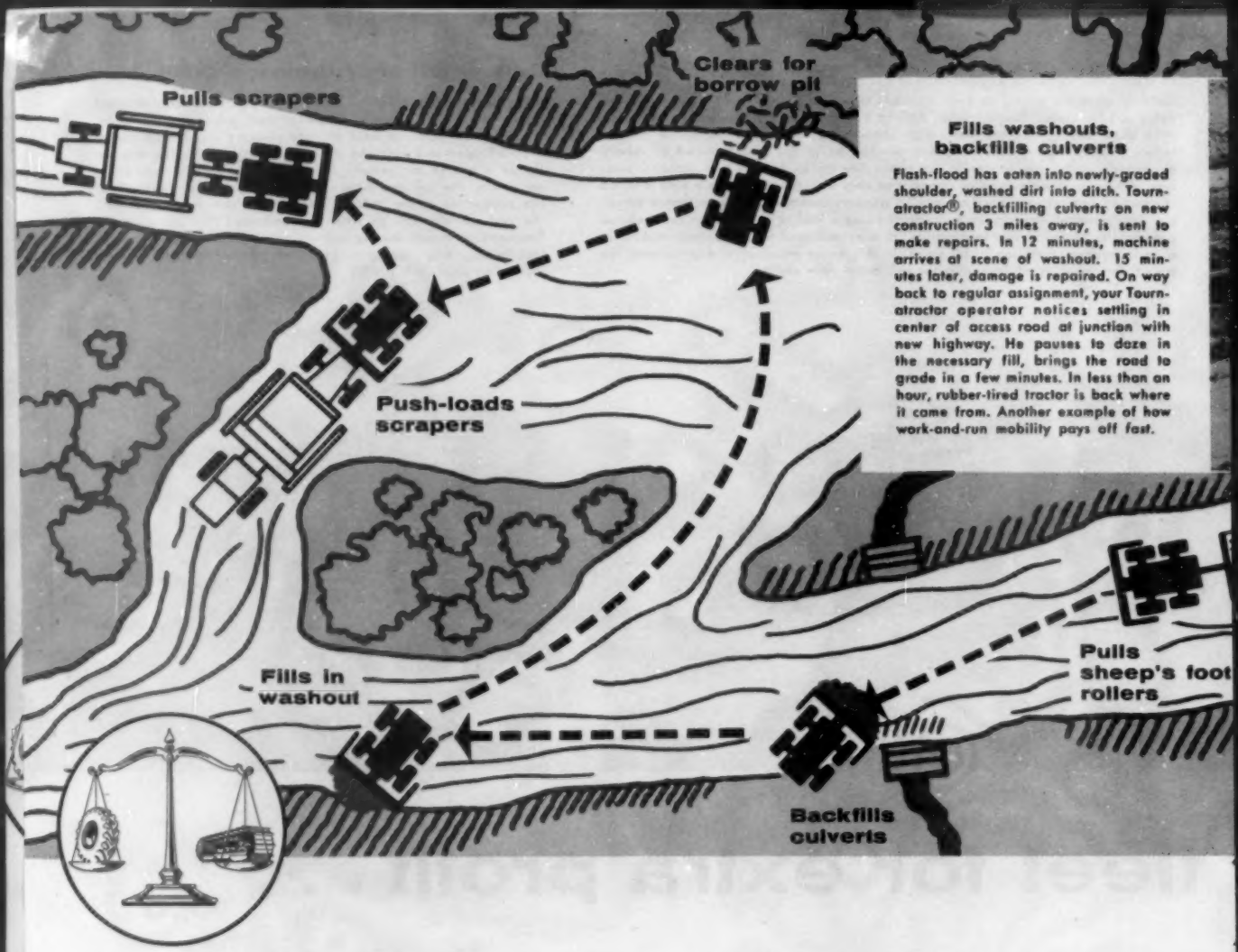
Balances production–cuts time lost in moves

When moving production fleet . . . self-propelled scrapers roll fast and easy over highway or right-of-way to new work area. Tournatractor rolls with 'em. Without waiting for crawler pushers, which must be loaded on flat-beds, hauled to the job site, and unloaded, your scrapers can begin work on arrival . . . with drive-in Tournatractor pushing. In this surface-skimming operation, Tournatractor will beat crawler-pushers any way because it maneuvers faster, gives scrapers a faster running start. At least an hour or so of profitable production is gained before slower crawler-pushers arrive. And, when short hauls bunch-up your scrapers in the cut, there is no need to lose production and profits. Just drive in Tournatractor. This speedy tractor will quickly balance your pusher operation 'till longer hauls get your production fleet back into an efficient spacing.

Dozes short-haul dirt for plus profits

A property owner near your job wants land leveled for building site, or drainage, or to enrich a farm field. You "borrow" Tournatractor from production fleet to do this job which may be several miles away. Traveling over highway, through city streets, fast, rubber-tired tractor can be at work site 4 miles away in 15 minutes. Machine goes right to work. Say the job is to stockpile topsoil . . . cut down some high spots . . . doze short-haul dirt to fill a small ravine . . . level surface to grade . . . then spread topsoil. Whole job takes only a few hours . . . fast-working and traveling tractor is back at main assignment with no delay to the main job . . . has earned $75 or so extra pay!

–more on following 2 pages



Fills washouts, backfills culverts

Flash-flood has eaten into newly-graded shoulder, washed dirt into ditch. Tournatractor®, backfilling culverts on new construction 3 miles away, is sent to make repairs. In 12 minutes, machine arrives at scene of washout. 15 minutes later, damage is repaired. On way back to regular assignment, your Tournatractor operator notices settling in center of access road at junction with new highway. He pauses to doze in the necessary fill, brings the road to grade in a few minutes. In less than an hour, rubber-tired tractor is back where it came from. Another example of how work-and-run mobility pays off fast.

BALANCE your tractor fleet

continued

If you are double-heading pusher units...

To get capacity loads, fast, for your biggest scrapers, use this LeTourneau-Westinghouse 420 hp, rubber-tired Twin-C® pusher. With its 40 tons tractive weight, four-wheel synchronized drive, with power-transfer differential, speeds to 20 mph, 7' high and 2½' wide tires, this machine develops 64,500 lbs. drawbar pull. It takes the place of tandem-pushers, gives you the economy of one-man, one-machine operation. With kingpin electric-steer it maneuvers fast, makes 60° turns right or left, lines up faster than any pusher you ever saw. Get full details on Tournatractor's big brother, the Twin-C.

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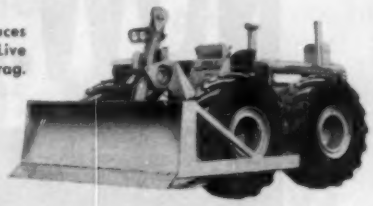

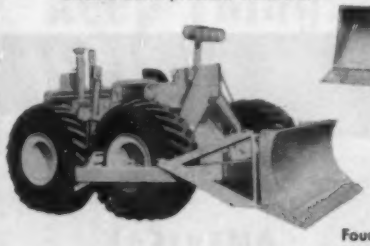

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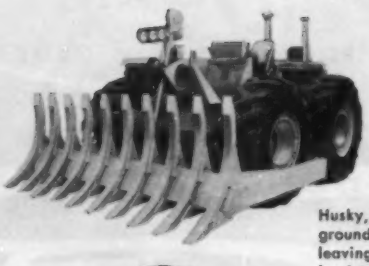

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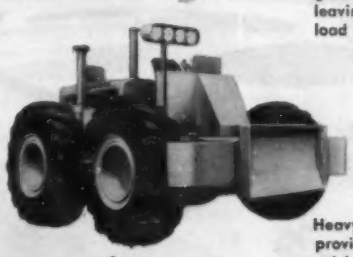

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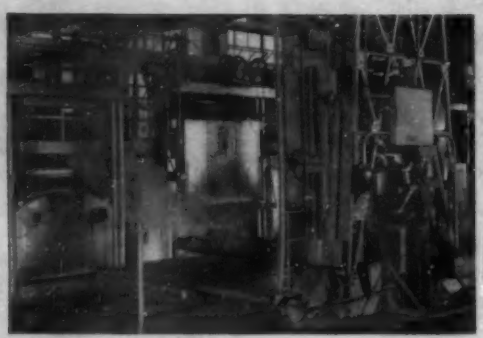

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In construction of the Boston Southeast Expressway, this Bucyrus-Erie 3-yd. 71-B shovel loads trucks with granite, rock and dirt. Marinucci Bros. & Co., Inc., Boston, is the owner of this machine.

P. T. & L. Construction Co., Paramus, N.J., used this Bucyrus-Erie 2-yd. 51-B shovel to cut down high ground for fill to be used for the Garden State Parkway in New Jersey.

Digging fill for the Georgia State Highway Department is this Bucyrus-Erie ½-yd. 15-B shovel, owned by W. J. Coulter, St. Elmo, Tenn. The machine is working near Flintstone, Ga., and the material being removed is hard shale.

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Suggested Design for an Experimental

This author asks: Why use high-tensile-strength steel, when the abutment-and-jacks method of prestressing can produce pavement of the same high load-carrying capacity at lower cost than non-reinforced conventional concrete? As here outlined, the savings would be huge and seem worthy of serious investigation. Roads and Streets invites comments from qualified readers.

By Edwin J. Coppage, Jr., Highway Engineer

It has long been recognized that nearly all of the troubles that develop in concrete pavements are in some way related to joints. None of the joint devices has proved as effective as desired. The experimental prestressed concrete pavement described herein has been designed to overcome the shortcomings of conventional pavements. Joint troubles in the proposed prestressed pavement would be virtually eliminated, since the joints would be under compression at all times and would behave similar to a monolithic pavement.

Another important advantage of prestressed concrete pavement is that maximum slab deflections under heavy loads will be less than half of the deflections for conventional slabs of equal thickness with no prestressing. Stated somewhat differently, prestressing enables a concrete slab to support a load approximately three times greater than it could support without prestressing, and with no increase in deflections. It is essential for good pavement performance that deflections be kept within limits that will prevent overstressing of the subgrade, since excessive deflections are responsible for the large majority of pavement failures.

The proposed prestressed pavement design should have an initial construction cost considerably below that of the least expensive conventional reinforced concrete design, and slightly less than the cost of plain jointed concrete pavement of equal thickness. This is at variance with the general conception that the construction cost of prestressed concrete pavement is too high to be of practical value. This concept is probably the result of associating the use of high-tensile-strength steel with prestressing, since that is the usual practice in prestressed bridge construction. The prestressing steel required to produce 500 psi (lb. per sq. in.) compressive stress in an 8-in. concrete slab is approximately 10 lb. per sq. yd. At the very conservative in-place price of $0.50 per lb., the cost of prestressing steel alone would be $5.00 per sq. yd.

Since 8-in. plain concrete pavement currently costs $4.00 per sq. yd., exclusive of joints, the total cost of steel prestressed pavement would be over $9.00 per sq. yd., which would be considered prohibitive by many.

Fortunately, it is possible to prestress concrete pavements without the use of steel and it is with this type of prestressed pavement that we should be presently concerned.

Briefly described, the prestressed pavement would consist of (1) normal plain concrete pavement 8 in. thick or less, with gaps approximately 2 ft. wide at 1,000-ft. intervals where the prestressing is to be applied; and (2) abutments to hold the prestress at the extremities of the project. Numerous types of abutments may be designed, varying considerably in cost and difficulty of construction. The designs shown in Figs. 1 and 2 were developed to be constructed with normal construction equipment and at minimum cost.

Abutment Size Unaffected

A point of particular interest is that the size of the abutments is unaffected by the length of the project for lengths over one mile; therefore, the greater the project length the smaller the abutment cost, prorated on a square yard basis. Trenchers, which are normally found on our present high-type construction, could be used to excavate for the concrete abutment walls in most soils. No framing would be necessary.

The number of abutment walls, or length of conventional pavement abutment, that would be required to preserve the prestress in the pavement varies with the type of subgrade or subbase material. The maximum stresses developed in very hot weather are expected to be approximately 2,000 psi, which would produce a total thrust of about 2,300 tons against the abutments. Although the proposed 10 abutment walls or the 1,800 ft. of

Prestressed Concrete Pavement

10-in. pavement abutment are probably more than will be required, it would seem advisable to overdesign until experimental projects have been constructed and data gathered regarding abutment performance.

To my knowledge there have been no prestressed highway pavements of this type constructed in this country.

The placing of this proposed type of pavement can be accomplished with conventional equipment and by normal construction methods. Even the prestressing can be accomplished with standard 200-ton hydraulic bridge jacks. Prestressing would be started after the concrete had attained a compressive strength of 4,000 psi, and preferably during cool weather when the temperature of the concrete is 50 degrees F. or below.

First Prestressing Joint

Operations should begin at the first prestressing joint located near the abutment. Jacks should be placed at 2-ft. intervals across the 24-ft. pavement width and the adjacent concrete stressed to 2,000 psi. This would produce a compressive stress of approximately 1,300 psi midway to the second prestressing joint. Subgrade friction would account for the 700 psi loss assuming a coefficient of friction between the pavement and subgrade of 1.5. Pressure on the jacks should then be lowered until the adjacent concrete is under about 1,200 psi. Stresses at the midpoint 500 ft. away from the jacks would then drop a lesser amount to approximately 800 psi. To hold this stress, 8-in. steel H-beams should be placed between the jacks. After removal of the jacks, the intervening space should be filled with concrete; however, on the initial experiments it would be desirable to place strain gages in some joints. In this case granular material topped with bituminous surfacing would be preferable.

This jacking operation would be repeated in successive joints spaced 1,000 ft. apart until the entire project was prestressed. To prevent closure movement at the next prestressing joint following the joint being jacked, this second joint should be strutted with steel H-beams prior to jacking.

For a period after completion of the prestressing there will be lower stresses in the concrete away from the 1,000-ft. joints than in the adjacent concrete; however, it is expected that repeated cycles of temperature change will bring about uniform stesses throughout the pavement. At 50° F. pavement temperature the prestress would be roughly 1,000 psi. With each degree rise in temperature of the concrete the stress would increase about 16 psi; therefore at 110° F. the stresses would approach 2,000 psi and at 0° F. the stresses would drop to about 200 psi.

During the period between placing the concrete and applying prestress, the 1,000-ft. long slabs would

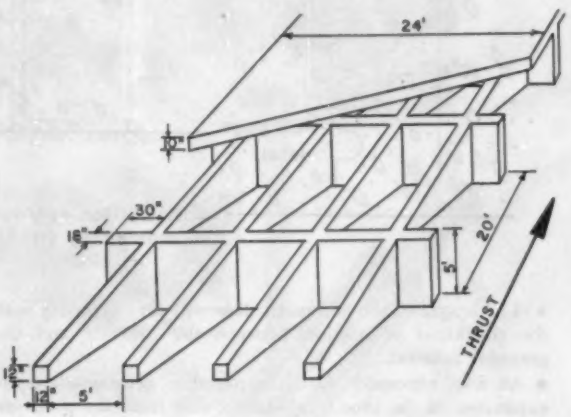


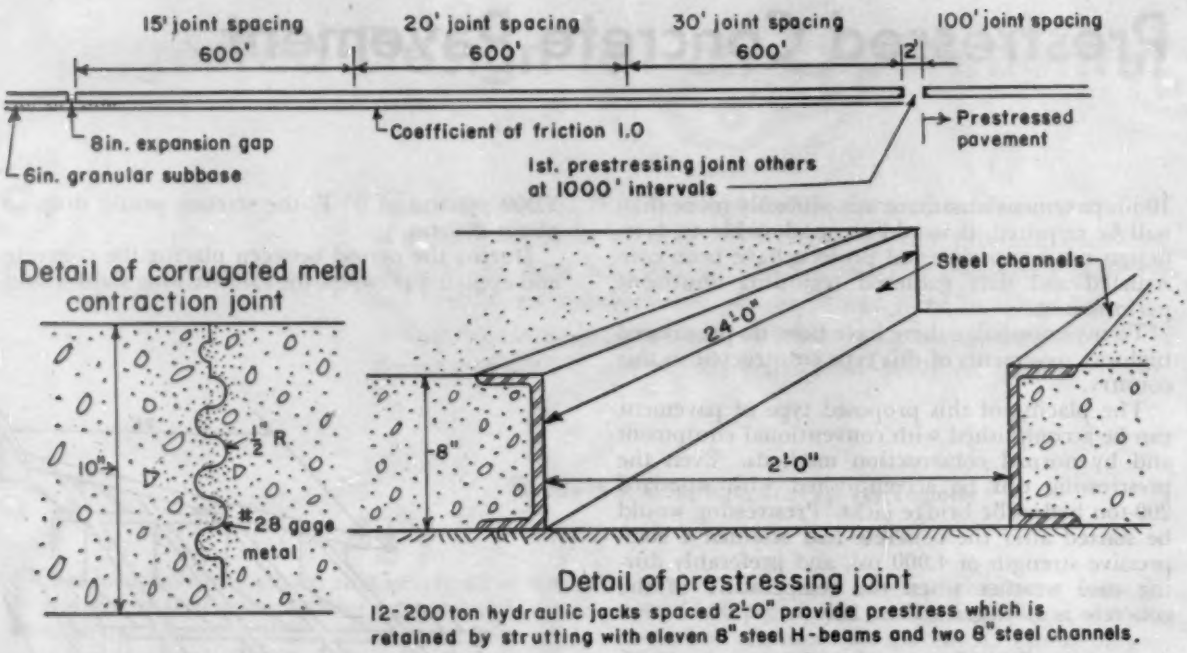
Figure 1

Abutment Design for Clay Soils

(Entrenched Wall Design)

- The perspective drawing of this abutment presents the view from the prestressed pavement side, looking toward the first transverse abutment wall. It is expected that more than three transverse walls will be required to restrain the maximum 2,000-psi pressure. On initial experimental projects, ten or more walls should be used in each abutment.
- The longitudinal walls taper in depth from 1 ft. to 5 ft. in each 20-ft. section, the purpose: to conserve concrete. A uniform 5-ft. depth would serve as well.
- If the soil is such that difficulties are encountered at the intersection of transverse and longitudinal trenches the transverse trenches may be omitted, the longitudinal trenches reduced to three in number, excavated to a uniform 5-ft. depth and the over-all length increased.
- The surfacing slab and trenches should be poured monolithically. Reinforcing steel is not required.
- Shrinkage cracks in the abutment will not interfere with its intended function.
- Square corners to the trenches or precise shapes are not required.
- For sandy soils that do not trench satisfactorily, the conventional pavement slab abutment shown in Fig. 2 would be preferable.

Figure 2.—Conventional Pavement Abutment Details



• The length of the abutment slabs will vary inversely with the coefficient of friction between the concrete and the granular subbase.

• An 8-in. expansion gap is required to accommodate the expansion of the 1800-ft. abutment slab from the prestressing temperature of 50° F. to the maximum of about 110° F. After maximum temperature has once been reached, there should be no further outward movement. In the interim period between prestressing and hot weather this gap should be filled with bituminous material.

• The use of corrugated metal joints should insure uniform distribution of the compressive stresses throughout the joint at minimum cost. Due to the configuration of these corrugated metal joints, their efficiency in transferring loads across the joint would be seriously reduced if openings in excess of 0.1-in. were permitted. Since the accumulative joint openings will vary in each of the three sections, the joint spacing was also varied to prevent the occurrence of individual openings in excess of 0.1-inch.

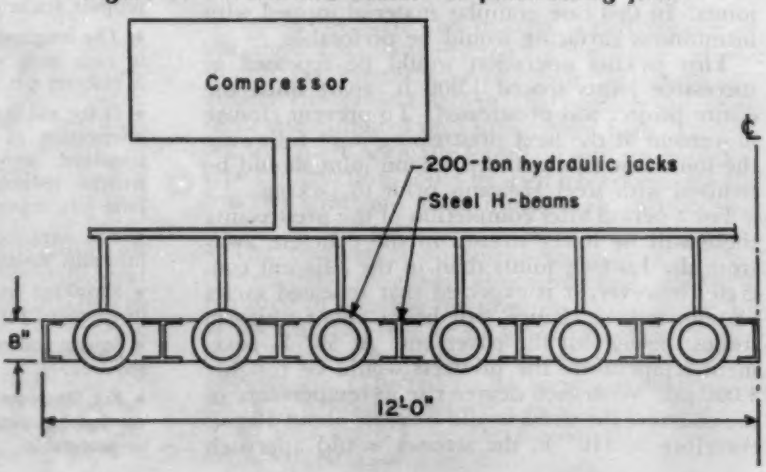
• A 10-in. slab thickness is used in the abutment, as it will have a service behavior more comparable to the 8-in. prestressed slab than would an 8-in. thick abutment slab.

be subject to tensile stresses produced by subgrade frictional resistance to slab contraction as a result of shrinkage in the hardening concrete and temperature drop. Transverse contraction cracks would be expected to form at roughly 100-ft. intervals. To control the location of these cracks and insure uniform distribution of pressure throughout the joint at minimum expense, corrugated metal contraction joints should be installed at 100-ft. intervals. These joints have been employed extensively in Texas where their use is now standard practice.

It is natural to wonder what would happen to a pavement under 2,000 psi compressive stress at curves and crests of hills. Since there has been no experience with such pavements, we must rely upon mathematical analysis to provide tentative answers. Computations indicate

(Continued on page 86)

Figure 3.—Transverse sectors at prestressing joint



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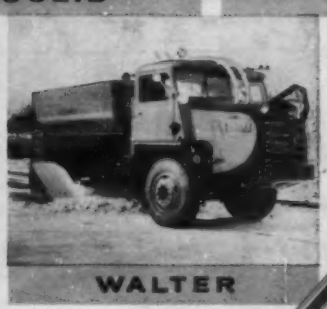
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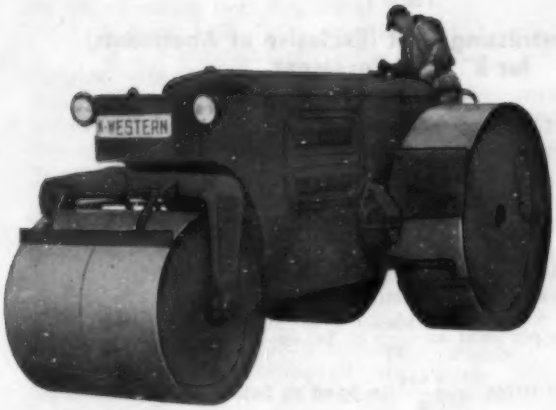

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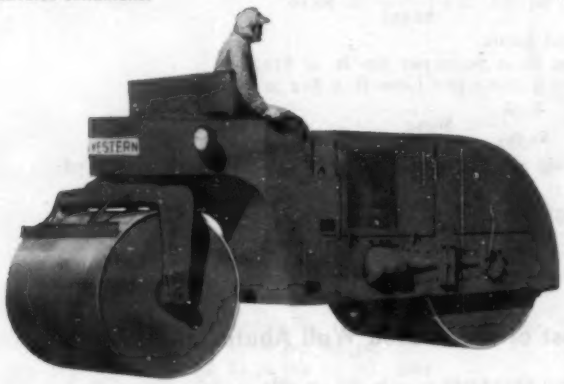

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All A-W 3-wheel and tandem rollers are powered by your choice of gasoline or diesel engines with 4-speed (regular) or 2-speed (optional) transmissions. Torque converter drives are optional. Drum-type front and rear rolls permit ballast variations in weight up to 4 tons.

Some of the A-W extras that give you better roller performance:

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- **3-wheel rollers have heat-treated alloy steel bull pinions and high-strength steel bull gears**
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- **Outside edges of finished rolls are beveled to prevent marks in hot materials**

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PRESTRESSED PAVEMENT

(Continued from page 82)

that no troubles are likely to develop for the degrees of curvature permitted on our modern high standard roads, particularly on the interstate system.

The outward thrust on a 3° curve would be restrained by a subgrade with a coefficient of friction of 1.0 together with the resistance offered by superelevation. Likewise the upward thrust on crests is exceeded by the restraining force of gravity for the curvatures permitted on the interstate system and other high-type roads.

On lower standard roads horizontal curves up to 6° can be readily accommodated by increasing the coefficient of friction to 2.0. Since the force of gravity cannot be readily increased, the maximum degree of vertical curvature of crests will need to be about 3 degrees.

Longitudinal drainage and bituminous treated shoulders should be provided to minimize the differential expansion and contraction of highly plastic subgrades, and reduce the chances of accidentally exceeding the vertical curvature limit. Since these measures will increase the life of any known type of pavement they should not be considered a cost increment for prestressed design.

Cost Comparison, Prestressed and Conventional Pavement

At current U.S. average price levels the construction cost of the proposed prestressed pavement is estimated at $4.14 per sq. yd. exclusive of abutment costs, which would be about $0.12 per sq. yd. for a 5-mile or $0.06 per sq. yd. for a 10-mile project.

The cost of a typical 8-in. reinforced concrete pavement using 54 lb. of mesh per 100 sq. ft., dowel load transfer assemblies at 40-ft. intervals, and 6 in. of granular subbase is $5.17 per sq. yd.

Plain 8-in. concrete pavement with corrugated metal joints at 15-ft. intervals and 6 in. of granular subbase, is $4.66 per sq. yd.

Plain 8-in. concrete pavement with sawed and sealed dummy joints at 15-ft. intervals, and 6 in. of granular subbase, is $4.60 per sq.

A continuously reinforced 8-in. pavement with 0.5% longitudinal steel (15 lb. per sq. yd.) and 6 in. of granular subbase, is $6.16 per sq. yd.

Since it is conservatively estimated on the basis of deflection characteristics that the 8-in. prestressed pavement will surpass in performance a 9-in. reinforced pavement costing $5.59 per sq. yd., a 10-in. plain sawed dummy joint pavement costing $5.34 per sq. yd., or an 8-in. continuously reinforced pavement costing $6.16 per sq. yd., the expected savings through use of this design range from $1.08 to $1.90 per sq. yd. or about $40,000 per mile of 4-lane highway.

Constructing the interstate system alone will require about 776,000,000

Table I

Estimated Prestressing Cost (Exclusive of Abutments) for 8" x 24' Pavement

Prestressing joint steel

11 - 8 in. steel H-beams	24 in. length = 11x38#x2′	= 836 lb.
2 - 8 in. steel channels	24 in. length = 2x20#x2′	= 80 lb.
2 - 8 in. " "	24 ft. length = 2x20#x24′	= 960 lb.
	Total	1,876 lb.

Cost of steel = 1,876 at $0.10/lb = $187.60 per joint
Cost of labor = 6 men at 2 hr. at $2.00/hr. = $24 per joint
Rental on hydraulic jacks = 12 jacks at $50/mo. = $600.00 for 5 miles
At spacing of 1,000 ft. = 5x5 miles = 25 joints

$$\text{Rental on jacks per joint} = \frac{\$600}{25} = \$24.00$$

$$\text{Cost of concrete between struts} = \frac{2'x24'}{9} \times \$5.00 = \$27.00$$

Cost of prestressing per joint

Steel	$188.00
Labor	24.00
Jacks	24.00
Concrete	27.00
Total	$263.00

$$\text{Cost of prestressing per sq. yd.} = \frac{\$263.00}{8x333} = \$0.10$$

Cost of corrugated metal joints
Per joint = 24 ft. at $0.50 per lin. ft. = $12.00
Per 1,000 ft. = 9 joints per 1,000 ft. x $12 = $108.00

$$\text{Per Sq. yd.} = \frac{\$108}{8x333} = \$0.04$$

Total Cost of prestressing and jointing = $0.10 + $0.04 = $0.14 per sq. yd.

Table II

Estimated Cost of Entrenched Wall Abutment (Fig. 1)

$$\text{Vol. Transverse Wall} = 1.5x5x24 = \frac{180}{27} = 6.7 \text{ cu. yd.}$$

$$\text{Vol. Longitudinal Wall} = 1x3x18.5 = \frac{55.5}{27} = 2.05 \text{ cu. yd.}$$

6.7x10 = 67.0 cu. yd. transverse walls
2.05x36 = 73.8 cu. yd. longitudinal walls
140.8 cu. yd. at $20.00 = $2,816
10-inch concrete slab 180′x24′ = 4320 sq. ft. or 480 sq. yd.
480 at $4.70 = $2,256 = Cost of 10 in. abutment slab
480 at $4.14 = 1,987 = Cost of 8 in. pavement slab
$ 269 = Differential to be added to cost of walls
Total cost of abutment = $2,816 + $269 = $3,085
Cost of abutments per sq. yd. for a 5-mile project =

$$\frac{2x\$3,085}{5x14,080 \text{ sq. yd.}} = \$0.09 \text{ per sq. yd.}$$

sq. yd. of paving both flexible and rigid. If about half of this were to be P.C.C., a potential savings of roughly $388,000,000 might be effected through use of the proposed prestressed design. To bring the remainder of the highways up to adequacy will involve an additional 1-½ billion sq. yd. of concrete pavement. Assuming one-half of this to be suitable for prestressing, the total potential savings exceed one billion dollars.

Usually when new designs or materials are proposed for lengthening the life or increasing the capacity of pavements, there is also an increase in the initial cost of construction. The proposed prestressed pavement is most unusual in that it holds promise of greatly increased life and load carrying capacity and yet offers a lower initial construction cost than conventional pavements.

Table III
Estimated Cost of Conventional Pavement Abutment

(See Figure 2)

Design: 10-in. concrete slab 1800 ft. in length with corrugated metal contraction joints as follows:
Sect. 1: 600 ft. of pavement with 15-ft. joints
Sect. 2: 600 ft. of pavement with 20-ft. joints
Sect. 3: 600 ft. of pavement with 30-ft. joints

10-in. slab cost = 8 in. slab cost + 2 in. conc. = $4.00 + .70 = $4.70
1800'x24' = 43,200 sq. ft. or 4,800 sq. yd. at $4.70 = $22,560

Number of corrugated metal joints = $\frac{600}{15} + \frac{600}{20} + \frac{600}{30} = 90$
Cost of joints = 90 at $12.00 = $1080

Cost of 6-in. granular subbase = 6" at $0.06 = $0.36 per sq. yd.
$0.36 x 4,800 sq. yd. = $1,728

10" slab	$22,560
Joints	1,080
Subbase	1,728
Total	25,368
Deduct cost of 8 in. prestressed (exclusive of abutment) 4,800 sq. yd. at $4.14 = $19,872	19,872
Cost of abutment	$ 5,496

Cost of abutments per sq. yd. for a 5-mile project:
$\frac{2 \times 5{,}496}{5 \times 14{,}080} = \$0.16$ per sq. yd.

Table IV
Estimated Cost of Various Types of Concrete Pavement

(Current U.S. average bid price levels as of the 3rd quarter 1956 were used in all estimates.)

Plain concrete (exclusive of joints and subbase)
8 in. thick $4.00 per sq. yd.
10 in. thick $4.70 per sq. yd.
Granular subbase 6 in. at $0.06 = $0.36 per sq. yd.
Sawed joints $0.35 per lin. ft. or
$\frac{\$0.35 \times 24'}{\frac{15 \times 24}{9}} = \$0.21$ per sq. yd.
Joint seal $0.05 per lin. ft. or
$\frac{\$0.05 \times 24'}{\frac{15 \times 24}{9}} = \$0.03$ per sq. yd.
Corrugated metal contraction joints
$0.50 per lin. ft. $\frac{\$0.50 \times 24'}{\frac{15 \times 24}{9}} = \$0.30$ per sq. yd.

(1) Cost of 8 in. plain concrete with sawed joints at 15 ft. intervals and 6 in. subbase: $4.00 + .21 + .03 + .36 = $4.60 per sq. yd.
with corrugated metal joints:
$4.00 + .30 + .36 = $4.66 per sq. yd.

(2) Cost of 10 in. plain concrete with sawed joints at 15 ft. intervals and 6 in. subbase:
Increased thickness = $\frac{10"-8"}{8"} = 25\%$
Increased cost = 25% x 70%* = 17.5%
($4.60 – .36) (1.175) + .36 = $5.34 per sq. yd.

(3) Cost of 8 in. reinforced concrete on 6 in. subbase:

Concrete	$4.00 per sq. yd.
Reinf. 54 lb./100 sq. ft. = 4.86 lb./sq. yd. at $0.12 =	.58 per sq. yd.
Dowell joints at 40 ft. = $\frac{24 \times \$100/\text{lin. ft.}}{\frac{24' \times 40}{9}}$ = .25	.23
Granular subbase 6 in. at $0.06 = .36	.36
Total Cost	$5.17 per sq. yd.

(4) Cost of 9 in. reinforced concrete on 6 in. subbase:
Increased thickness = $\frac{9"-8"}{8"} = 12.5\%$
Increased cost = 12.5% x 70%* = 8.75%
($5.17 – .36) (1.0875) + .36 = $5.59 per sq. yd.

(5) Cost of 10 in. reinforced concrete on 6 in. subbase:
Increased thickness = $\frac{10"-8"}{8"} = 25\%$
Increased cost = 25% x 70%* = 17.5%
($5.17 – .36) (1.175) + .36 = $6.01 per sq. yd.

(6) Cost of 8 in. continuously reinforced concrete on 6 in. subbase:

Concrete	$4.00 per sq. yd.
Steel ½% = 15 lb. per sq. yd. at $0.12 =	1.80
Granular subbase 6 in. at $0.06	.36
Total Cost	$6.16 per sq. yd.

*Studies have shown that the cost of a square yard of concrete pavement does not vary directly with the thickness due to certain constant cost elements such as finishing, curing, moving in equipment, etc., but increases approximately 70% of the increased thickness. For example, a 10% increase in thickness would generate a 7% increase in cost.

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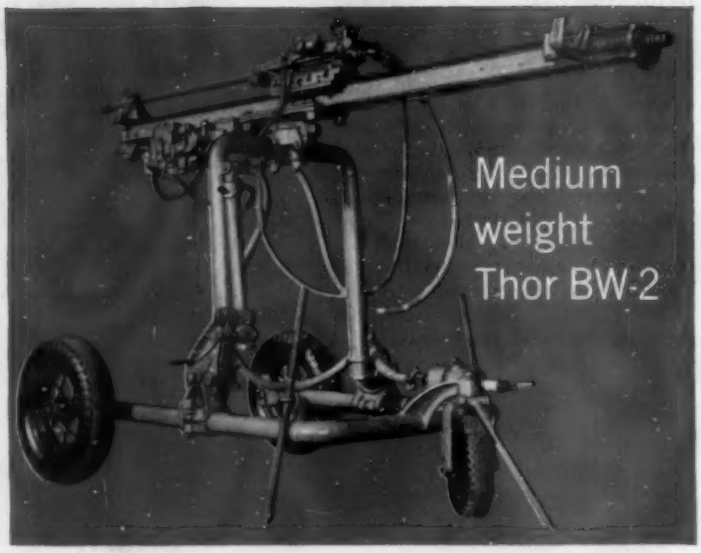
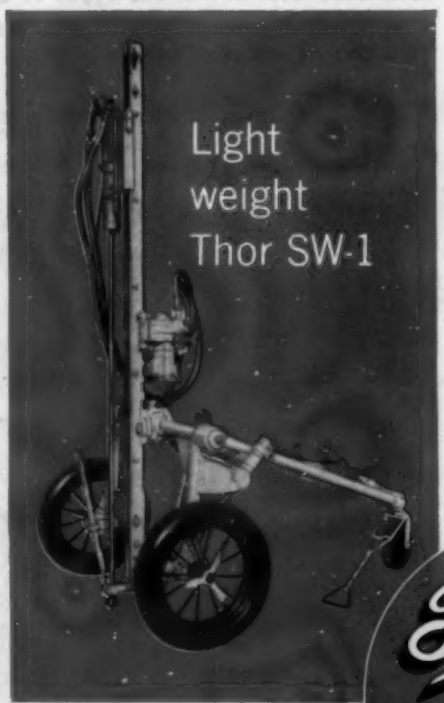
Thor's super-powered 105M drifter rock drill • Rugged Thor BW-2 wagon drill mast and air feed motor • Self-propelled with two 7½ h.p. Eimco air motors, power aplenty to haul itself and air supply • Rigid frame, proved in tractor design, long-lasting, low maintenance • Aircraft-type accumulator in hydraulic system maintains complete rigidity • Simple hand-operated track take-up • No track locks required • Large flat platform, good for tool and fuel storages—ideal for operator when drilling toe holes.



THOR BW-2

The medium weight BW-2 comes equipped with Thor 4" bore drifter. Has 800 to 1000 lbs. pulling power for steel removal, a 5 h.p. rotary air motor, variable speed control.



THOR SW-1

Thor's lightweight SW-1 delivers real economy in rock drilling. When equipped with a 55 lb. sinker, its lower air requirement permits the use of a smaller capacity compressor. Thor's SW-1 drills holes in any direction, at any angle—on level or sloping ground. 3-wheel reinforced compact rig—wet or dry operation—mast swings 360° vertical or horizontal—handles up to 3½" bore drifter.

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Microwave - VHF System Serves Toll Road

EXPRESSWAY planners throughout the nation are studying the latest in communication systems such as that now in operation along the Indiana Northern East-West toll road. Extending in both directions from a control center near South Bend, a combination microwave-VHF system is providing complete integration of mobile radio units, telephones and teletypewriters located at various points of the road from one end to the other.

The system includes seven microwave stations, 10 VHF base stations, a dozen fixed station units for toll plazas, and 65 mobile radios for use in police cars, maintenance vehicles, tow trucks and snow-removal units.

Engineers of the General Electric Communication Products department designed the system to meet specifications of the Indiana Toll Road commission. The police-maintenance microwave hookup, 110 miles long, provides instantaneous communication along all 157 miles of the twin-lane highway.

The contract for installation was awarded in April of 1955. The first equipment went into use when the toll road opened last fall. Each interchange in the system is equipped with a VHF base station for quick communication to five major maintenance buildings housing offices, police personnel, maintenance trucks and road machinery.

All five maintenance buildings have two identical VHF circuits—one for patrol use and the other for maintenance. Complete duplicate equipment has been installed for standby purposes, permitting automatic transfer to standby devices if some portion of the regular transmission fails.

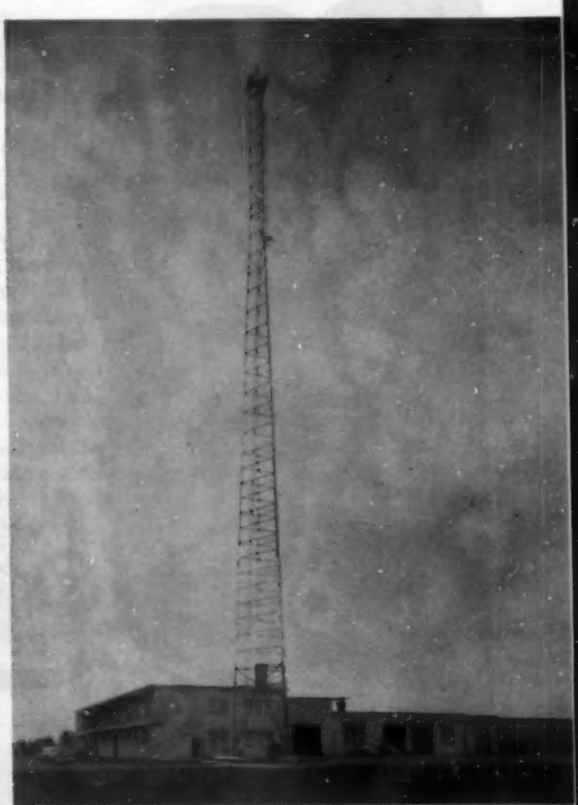
Handsets and speakers are located at various places in each building. Speakers linked to the police radio system have been located in the patrol barracks and those containing maintenance are installed in maintenance areas.

Thus both practicality and convenience are served by the scattering of speakers throughout.

Telephones in each of the maintenance buildings are linked with an automatic switchboard. By dialing a code number, individuals using telephones in maintenance areas may be connected with the microwave transmissions system.

The South Bend control center is operated by police personnel at all times. Lights on the control console indicate whether normal or standby equipment is in use at various points in the system. Light signals also show which base station receivers are in use and whether calls in some buildings are being originated with handsets.

- **Microwave radio towers such as this one, located near South Bend, relay radio signals traveling in line-of-sight paths along the Indiana toll road. Placed strategically at a few points along the road, the towers eliminate the necessity for costly wires and poles, which, in other forms of communication, would have to be strung and mounted over the entire route.**



- **The Indiana State Police toll road patrol directs the road's communications center. The system links police cruisers, emergency vehicles, official cars and toll road offices.**

● Complete truss being tested at the Engineer Research and Development Laboratories, Fort Belvoir, Va. Here, a bridge is supporting 880,000 lb in army tanks .(U.S. Army photo)

400-Ton Testing Machine for Army Bridge Research

A machine capable of applying loads up to 400 tons on experimental military bridges is being used in the Corps of Engineers' program at its research and development laboratories at Fort Belvoir.

The machine is making ultimate capacity tests and is helping the assignment of narrow margins of safety. Among the structures recently tested was a complete railway truss bridge 120 ft. in length, for which the machine's capacity was augmented by four military tanks.

A hydraulic system which supplies the necessary forces for loading is capable of applying pressures as high as 10,000 psi. However the working load pressure is just over 7,000 psi. A safety valve in the system is set at this pressure to prevent damage to girders or columns.

Material Analysis Speeded by Spectrograph Methods

Speedier and more efficient analysis of many materials used in road and bridge construction is promised by the Pennsylvania department of highways as the result of a new instrument in the materials laboratory at Harrisburg. The instrument is a 3.4 meter plane grading spectrograph which can be used to analyze the qualities of virtually anything on the basis of the spectrum.

It will permit better control over the quality of materials used in construction while at the same time eliminating many tedious and time-consuming chemical "wet analysis" procedures now in use.

The instrument is being set up in a separate room where the temperature will be maintained at 70 degrees. It was purchased from the Jarrell-Ash Co. of Newtonville, Mass., at a cost of $25,000.

The spectrograph is used to take photographs on glass of the spectrum of a sample of material. This picture then is compared with a photograph of a spectrum of material meeting department standards.

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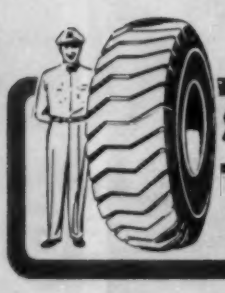

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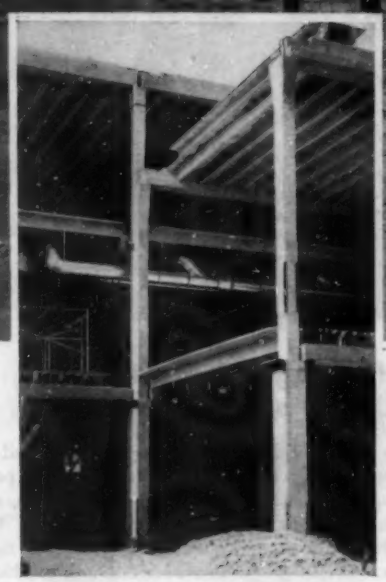

Allison-Erwin Warehouse and Office built with deflected strand precast prestressed concrete members fabricated and erected by Concrete Materials Incorporated, Charlotte, North Carolina. The seven-wire uncoated stress-relieved prestressed concrete strands were manufactured by Roebling.

Floor bays 27' x 27', prestressed girders and double tees have poured-in-place cover which forms composite section. Live load 200 lbs. per sq. ft.

Roof bays 27' x 54', prestressed girders and double tees. Live load 30 lbs. per sq. ft.

Erection was speeded by use of precast reinforced concrete columns.

Architect-Engineer—J. N. Pease & Company, Charlotte, N. C.
Contractor—Goods Construction Company, Charlotte, N. C.

NOW—INCREASED LOAD CAPACITY with PRECAST PRESTRESSED CONCRETE MEMBERS using DEFLECTED STRAND TECHNIQUE

Many successful applications in structures of virtually every description have proved the tremendous benefits of precast prestressed concrete members using straight strands.

Now architects and fabricators are finding that the deflected strand technique *further increases* the maximum span and load-carrying capacity of precast prestressed members. In fact, the only limitations of this method are casting-bed capacity and transportation facilities.

An additional advantage can be gained in multiple span structures by the use of continuity. This is achieved by placing ordinary reinforcing bars across the construction joints and pouring a small amount of concrete in place around these bars.

For data on tensioning elements and general information on prestressed concrete, write Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

Consult Roebling . . . First in U. S. with prestressing and tensioning elements.

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"When you hit something solid you don't tear-up this grader"

That's what F. M. Moyer, owner of Moyer Construction Company, Staunton, Virginia, says about his Adams 550 with *creeper gears*. Mr. Moyer was building 6.2 miles of 24' roadway for new State Highway 635, linking Hume, Va. with U.S. Route 522, to the west. Here his "550" worked with a spread of other machinery, for Virginia Department of Highways.

"550" grades sandy clay, granite rock

On this job the Adams grader sloped banks, cut ditches, elevated curves, and bladed surface; grading an average of 1,000' of roadway per day. Ordinary work was handled in 1st and 2nd gears (2.2 and 3.2 mph). Where rock was encountered, the operator shifted to one of 3 creeper gears . . . using *full engine-power at speeds as slow as 34 ft. per minute* (.39 mph).

Commenting on the Adams grader, owner Moyer said, "I especially like two things . . . power-shift moldboard, and creeper gears. Particularly like the creepers, because they give you full horsepower at slow travel. When you hit something solid, you don't tear up the grader. Foot accelerator is handy, too."

As to operating ease, operator Eugene Baker says, "This '550's' the best grader I've ever operated. I like the hydraulic moldboard and foot throttle best of all its features."

Moyer's "550" reverses on shuttle-work in narrow cut, at 13.2 mph. High reverse speeds boost output, save time in maneuvering.

After sloping bank, Moyer Construction Co's. "550" blades dirt to center of cut. Power-shift moldboard is praised by operator and owner. Operator shifts moldboard right or left by power in seconds, on-the-go . . . reaches out, works around obstacles.

Smooth Power for rugged work . . . extra-slow speed for precise grading

On all Adams graders with conventional drive, optional *creeper gears* give you operating speeds as slow as 30 to 36' per minute with engine wide-open . . . even slower (to 20'/min.), with throttle cut back. These extra-low, power-speed ratios concentrate full engine-power for heavy slow-speed work, such as ripping up old roadways, and pulling stumps. They provide safe, maximum controlled power for work in rocks and roots. They also help you when cutting fine grades . . . work and maneuver in close quarters.

Creepers eliminate need for slipping the clutch at high rpm to get steady push-power at slow speed . . . reduce shock-damage to blade mechanism as well as excessive clutch wear. Optional creeper gears may be factory installed on new equipment or may be added in the field at any time.

Total 15 speeds

In addition to creeper speeds, all 80 to 150 hp Adams graders have an 8-speed transmission (8 speeds forward, 4 reverse) as standard equipment. You get more working speeds forward and reverse for more effective use of power to cut deeper, move bigger loads, work faster than other machines. With higher reverse speeds (to 13.7 mph), these graders also cut non-productive back-up time on the job. On the highway and between jobs, your Adams wastes no time, as it "roads" to 26 mph . . . drives safely and easily as a truck.

Adams new big 190 hp POWER-*Flow* 660 grader, with torque converter, gives you *automatic* matching of power to load . . . the effective work-power of an *infinite* number of full-throttle, power-speed combinations within 4 speed ranges: 0.0 to 27.4 mph forward, 0.0 to 24.4 mph reverse.

Check all the profit-building features of modern Adams graders . . . the many ways they can help you produce more work, faster, at lower cost . . . the way they can shorten your job completion dates. 6 models: 190, 150, 123, 104, 80, 60 hp. Choice of GM or Cummins engines on 5 larger models. Call or write for a demonstration.

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T-POWER radio is another example of Motorola's continuing leadership in the practical application of transistors in mobile radio. Other tested and proved transistorized products include the Dynamic Microphone and Power Voice Speaker.

Get all the facts.—Write now for literature with complete information.

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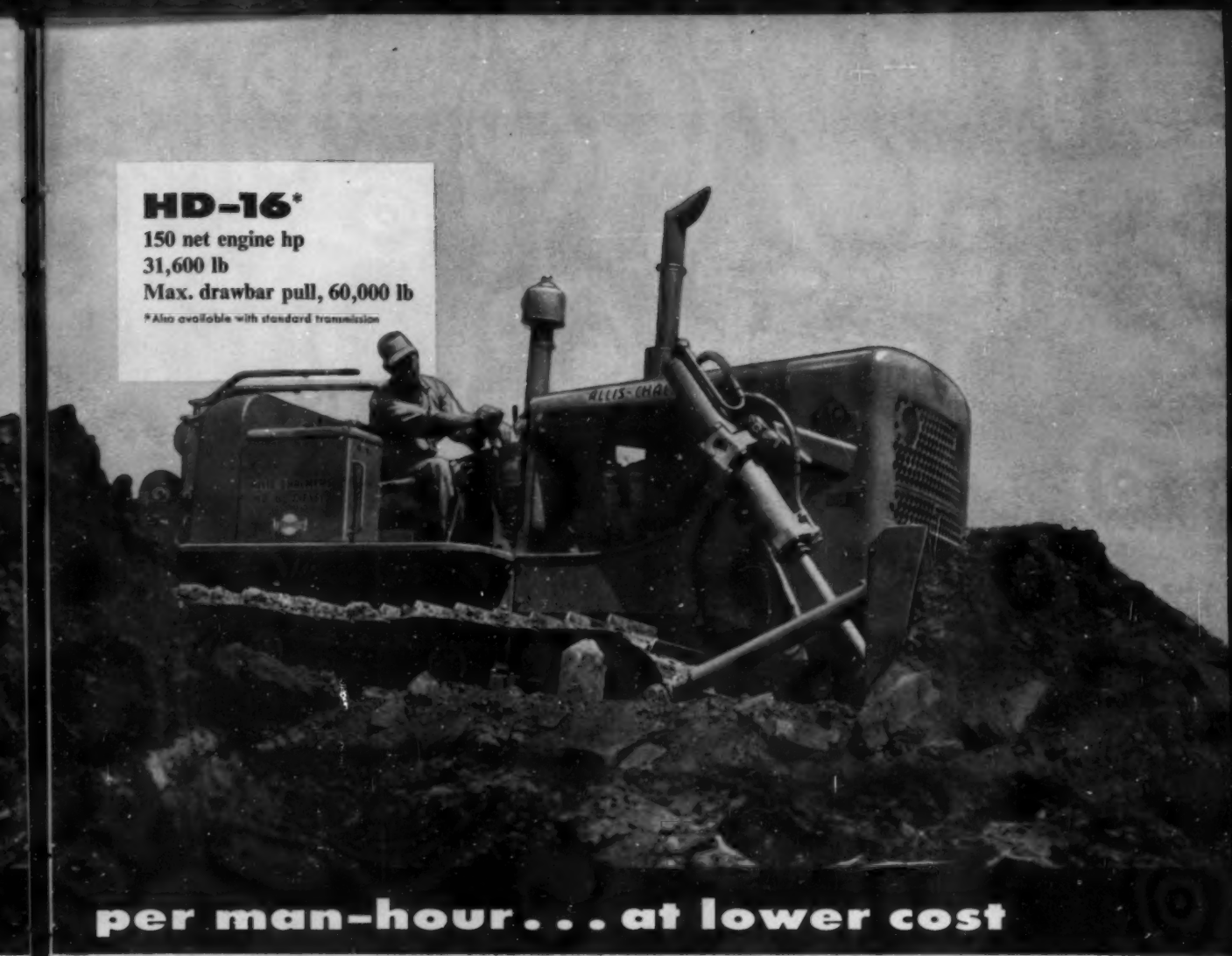
More efficient dozing—Matched engine-converter-transmission team lets operator choose speed range for each job as he starts . . . finish most jobs without further clutching or shifting (except for reverse). With full control at throttle, he can work safely and efficiently regardless of terrain.

Faster on tough scraper jobs—These Allis-Chalmers tractors multiply torque up to four and a half times . . . develop maximum drawbar pull when it's needed most . . . start the load smoothly regardless of material in the cut . . . automatically accelerate to the highest speed that conditions permit.

Nothing like 'em on big loading jobs—The 3-yard HD-16G and 4-yard HD-21G tractor shovels are tough, mobile, flexible enough to pay big dividends on many projects. Operators can crowd surely and steadily . . . without stalling, shifting gears or losing control of the bucket because of slow engine speeds.



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Longer life for big equipment—Hydraulic torque converter cushioning reduces shock and vibration on the power train, the entire tractor and its auxiliary equipment—mounted or drawn. That means less downtime, more production time . . . better profit protection on any job!

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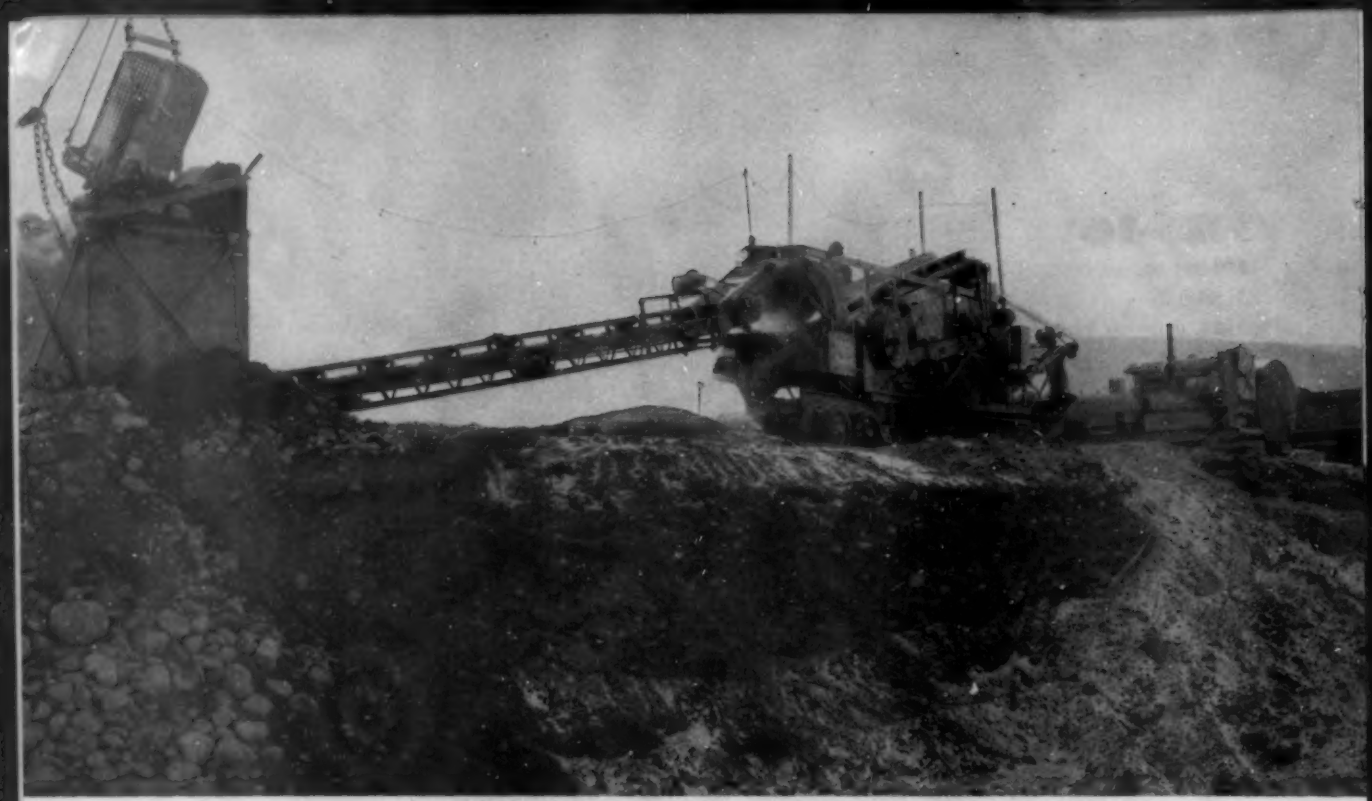

The 101-SE is a highly portable plant. The frame is extra strong to hold rigid alignment of all equipment and drives. A rocker beam with full width axles supports most plant weight. Four wheels, each with dual tires, oscillate separately to compensate for rough terrain.

Big Production at your Fingertips with the New AUSTIN-WESTERN push-button controlled Diesel-Electric 101-SE

Here's a high output, mobile gravel plant that combines top efficiency with modern ease of operations and low maintenance. It is DIESEL-ELECTRIFIED, PUSH-BUTTON OPERATED—a triumph in crusher engineering.

All plant components except jaw and roll crushers are electrically operated in this closed circuit plant. All operations are powered with individual electric motors through short coupled V-belt drives, instantly controlled from the operator's platform. Chains, idlers, sprockets and clutches, normal cost items on mechanical plants, are eliminated.

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See your nearby Austin-Western distributor . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio, for illustrated booklet.

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Welded steel plate crusher frame for high strength without weight of cast steel frame.

Inclined positive-throw type vibrating screen.

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Leone Construction equipment at work on grading, surfacing and oiling 10½-mile stretch of improved highway west of Walsenburg, Colorado.

More than 200,000 tons of surfacing material were produced by this Barber-Green "hot mix" plant for Colorado highway 160.

Leone earth-moving equipment handled more than 2 million yards of material during 1956 construction season.

"Our experience with Phillips *66* motor oils has been highly satisfactory year after year."

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John Leone, son of Domenic Leone, who founded the company in 1919, says, "As long as I can remember we've had dependable service from Phillips *66* products. We sure recommend them highly."

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What Contractors Need to Know on

Economics of Scraper Design and Loading

A review of fundamentals and facts and figures on a subject that lies at the heart of the grading contractor's job planning and operation.

By Dan Heiple

Chief Field Engineer, LeTourneau-Westinghouse Company

THE ECONOMICS of earthmoving involve the same basic principles as the accomplishment of any other kind of production work. All include a force or load and a distance in a given time interval. One electric motor may turn 1,725 rpm, another 3,450 and both produce ½ a horsepower. One can carry twice the torque load, both can be made to do the same amount of work.

The same is true in dirt moving; we can carry 20 cu. yd. per load and make six trips per hour, or 12 cu. yd. per load for ten trips per hour, or 30 cu. yd. at four trips with the same end result—120 cu. yd. per hour. We have done the same work. The difficulty in this over-simplification is that it ignores the most important factor to all of us, the cost, which may or may not be the same in each case. It is the cost factor which dictates the science of earthmoving equipment design and use. Generally speaking, lower costs result from high production, but high production from the same horsepower, the same manpower, the same over-all costs.

Twenty years ago the two-wheel prime mover did not exist. The carryall scraper had been off steel wheels and on tires but a short time. A 12-yd. scraper was a big one. It took the power and weight of the crawler tractor of that day to make the 12 yd. load. But when shifted into higher gears, it loafed off with a fraction of what it could pull.

The end result was that with a loading time of 1 minute on a total cycle of 5 minutes, the contractor bought a tractor of a size needed only 20 percent of its working time. And since earthmoving is a one-way haul, with the return trip an empty one, 40 percent could easily be dead heading.

Some jobs of course, due to grades or deep going, did use the tractor power, but in general the economics of such methods could not stand up to competitive production earthwork.

The solution then was to relate the load size to

(Continued on page 100)

Remember Tandem Loading?

For a time the idea of two scrapers behind one tractor was thought to have great promise. Not used today, except in occasional special circumstances. This article explains why other methods have superseded.

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● **Push-loading was a major "break through" in method, and is still today the key to scraper job profits.**

ECONOMICS OF SCRAPER DESIGN

(Continued from Page 98)

the ability to haul, and the problem became how to obtain such a load. In scraper work a good rule of thumb was, and is still, that 1 lb. of drawbar pull could load 1 lb. of earth in 1 minute.

An early attempt to jump this hurdle was the tandem scraper hook-up. The tractor operator was simply given two 12-yd. scrapers to handle with one tractor, loading one at a time. A 4-drum cable unit and a second scraper difficult to see and to maneuver with created some operating problems, but it is interesting to compare possible production rates.

Assume the tractor loads one scraper to 10 cu. yd. (bank) in 1 minute and is on a 6-minute total cycle. On a 50-minute per hour efficiency the result is 83 cu. yd. per hour.

Now put two scrapers behind the tractor, remembering that it has enough horsepower to pull them both as fast as it can pull one, but giving the operator 2½ times as long to load because of the problems we mentioned and include an extra minute to dump and turn. The complete cycle is 8½ minutes, but with 20 cu. yd. per load, production is up to 117 cu. yd. per hour. This is a 41 percent gain.

This method was highly successful on some work and is currently at use on a modern rubber-tired spread, but was too cumbersome for general acceptance, and has for all practical purposes disappeared.

A logical improvement on tandem operation was the double-bucket scraper, in effect putting the tandem scraper operation into one unit. To compare with tandem production, it is reasonable to eliminate one minute from the load, dump, turn and acceleration time. This results in a 7.5 minute total cycle, and a 20 cu. yd. load results in 133 cu. yd. per hour. Production increases 13 percent over tandem operation, 60 percent over the single 12-yd. scraper. Operationally good, even if sometimes mechanically troublesome, the double-bucket scraper was a good one.

Contractors, however, were not long in coming up with the method that carries forward to this moment. Their solution: a scraper big enough to be a hauling load for one tractor, another tractor behind it to push in the loading cycle, i.e., two tractors to load, one to haul. Load time drops back, load stays up. For a conservative comparison with the original 6-minute cycle, add ½ minute. The resulting 6.5-minute cycle and a 20-cu. yd. load produce 154 cu. yd. per hour. Production at this point is up 85 percent over the 12-cu. yd. scraper self-loaded. That pusher tractor costs something of course, and if it is going to take a 24-yd. scraper and two tractors to boost production 85 percent, the economics could have remained in doubt. Production work solves this one easily. On a 6-minute cycle, the pusher tractor easily handles three tractor-scraper units, sometimes four. Then four men, four tractors and three scrapers with 20-yd. loads come up with 462 cu. yd. per hour as compared with 332 cu. yd. for the same four tractors all of them hauling 10-yd. loads. For the fleet, a 40 percent production increase is realized by push loading the big ones. The solution simply involves putting available tractor power to work a higher percentage of the time.

The next step is to add speed, and the logical step,

(Continued on Page 103)

● **Crawlers were still being used prior to the World War to move scraper loads that left much of tractor horsepower unexploited except during loading.**

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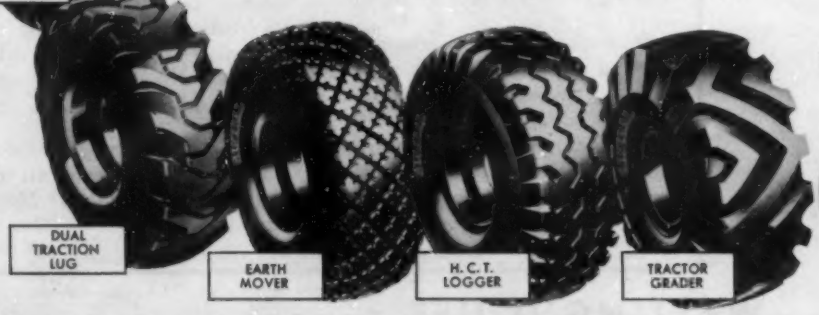

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U.S. 112 Bypass, Niles, Michigan

Garavaglia & Pierson Contracting Co.'s D Tournapull spreads gravelly dirt from drainage ditch cuts, to build up shoulders on contractor's 2.9-mile road grading and paving job, 5 miles north of Niles. "'D' *beats them all,*" says Supt. Waino Niemi. "*It's an excellent piece of equipment compared to others. Wish we had more of them.*" Grade Foreman, Mike Kitchen, admits he's an old "D" fan..."*I've always liked Model D's. They're really handy for trimming.*" From the cockpit, operator Dallas Bauer shouts, "*This machine is as good a dirtmover as you'll find.*"

U.S. 12 Bypass, Jackson, Michigan

Another G & P Co. Tournapull self-loads sand... grades and levels sand cushion for 13.2 miles of 2-lane concrete roadway. Says Paving Superintendent, John D. Stein, "*We're well satisfied. This 'D' was purchased strictly for clean-up... and it performs its job very well. Service from our dealer has been good.*"

for clean-up and handyman dirtmoving this Michigan outfit likes roadable "D's"

Two LeTourneau-Westinghouse D Tournapulls® are shown moving dirt on two of Garavaglia & Pierson Contracting Co. work projects, 125 miles apart... 82 and 193 road miles from contractor's home base at Center Line, Michigan.

These easily roadable scrapers fill contractor's need for fast, flexible dirtmovers to handle both large and small yardage assignments on contracts all over Southern Michigan, Northern Ohio and Indiana. "D's" travel under their own power... with regular operator at the controls. Garavaglia & Pierson found it profitable to drive their 29.5 mph Tournapulls as much as 200 miles from home base, to handle clean-up and handyman earthmoving on large road building projects, and other work. Efficient, roadable "D's" will pay off on *your* scattered dirtmoving assignments too!

New 9-yd. D Tournapull works alone, or in fleets

With its bigger capacity, new 9-yd. D Tournapull is large enough and fast enough for profitable use in pusher fleets... yet small and maneuverable enough for economical one-man, self-load dirtmoving. On production jobs, Tournapull works fast... moves more earth in less time than big crawler-scraper combinations costing thousands of dollars more.

"D" works in tight quarters and around obstructions, makes 180° turns in an area only 24'3" wide (nearly 4' less than its length) Its finger-tip electric controls precisely regulate depth of cut or spread to accurately satisfy specifications. Tournapull's exclusive power-transfer differential keeps machine working in footing where other scrapers bog down.

Highway mobility cuts delays

You don't need a truck and trailer to haul this "Handyman D". It's just 8' wide, under 9-ton axle-load limits, and rolls on big rubber tires... roadable in 48 states without permit. You eliminate all loading and unloading costs ... reduce work-stopping delays. "D" *runs* from one work site to the next at speeds to 29.5 mph.

Call or write for complete information and a demonstration of new roadable, 9-yd. "D Handyman" Tournapull.

DP-1252-H-b

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● This scraper-pusher combination is favored where the mobility of rubber-tires can be exploited.

SCRAPER DESIGN

(Continued from Page 100)

the rubber-tired prime mover.

The rubber-tired prime mover is specifically designed on the principle of horsepower utilization. In its early use most people believed, and some still do, that the inability to load itself was a weakness—that this was a problem equipment designers should solve and some day would. The tractor-scraper loading and hauling comparisons were included to demonstrate that the inability to load independently is a deliberate design strength, not a weakness.

Rubber-tired prime movers have been built to self-load scrapers. They meet special job conditions, but suffer from the same basic principles of earthmoving economics as already demonstrated. The weight and horsepower that can load 15 tons of material in one minute can easily haul 30 tons at 15 to 25 mph. Mathematically of course you might use the weight and horsepower that load 15 tons to boost haul speed up into the 50 mph range, and come out with a proper economic answer. Practically, however, most jobs could not support the high type haul road that would be required; plus the fact that a 25 to 1 transmission range poses some major engineering problems. Unless hauls are unusually long or horsepower again excessive, the top speed is rather meaningless because of the time required to accelerate.

Retains Mobility

The rubber-tire prime mover sacrifices a portion of the crawler tractor's ability to negotiate mud, but retains more than sufficient mobility for most job conditions. Generally it can be said that where earth involved is an acceptable construction material, the rubber-tired prime mover and scraper have tractive ability to handle it. The rubber-tired solution, then, has been toward both bigger loads and higher average speeds. The major contribution of the wheel tractor, however, has been the higher average speed.

I emphasize the word "average." High average speed versus high speed is definitely significant. Length of haul, together with the loaded power-to-weight ratio, spell out the result much more often than a top speed figure from specifications.

For instance a 200-hp unit with a 40-ton loaded gross weight has 5 hp per ton. It can accelerate against a rolling resistance of 55 lb. per ton through 5th gear to 20 mph in about 2.5 minutes, and a unit of this power-to-weight ratio will travel 3,394 ft. in doing so. This is an average speed of 15.4 mph for the distance involved. Obviously on a one-way haul of this distance or less, a higher top speed is meaningless.

By comparison 5¼ hp per ton can accomplish the same job in 1.64 minutes and 2,155 ft. and will average somewhat better. The assumption here has been that all items were identical except for power.

An important factor, however, is a set of transmission ratios to use the horsepower. For the same conditions, a 4-speed transmission limits the working ability of the 5¼ hp-per-ton ratio to the point that it will take 1.82 minutes and 2,300 ft. to reach the 20-mph speed. Conversely, eight speeds with a 5 hp/ton ratio produce a unit that can beat all combinations considered to 20 mph in 1.47 minutes and 1,925 ft.

High Speed Unnecessary

The high average speed need not be phenomenal to produce a rather remarkable increase in yards per hour. On recap of records several years ago covering average hauling speeds of rubber-tired prime movers for 100 jobs, we found that, although where conditions were favorable the average haul speed was rather high, the average of all jobs was about 10 mph. Using this average haul and return speed for comparison in the original problem for both a 10 and 20 cu. yd. load gives the following results. Total cycle drops by 1.4 minutes and production with the 10-yd. load reaches 108 cu. yd. per hour. With the 20-yd. load, production per unit reaches 196 cu. yd. per hour. This is 27 percent over the tractor-scraper of the biggest size, push loaded. All factors except haul speed were kept identical. This is short-haul work and the speed certainly not excessive.

Once having added higher average hauling speeds to earthmoving, however, the rubber-tired prime mover has made the time of every other part of the cycle more important to the production picture.

For instance, a 1 minute load time is 16⅔ percent of a 6-minute tractor cycle, but is 21.7 percent of a 4.6-minute cycle for a rubber-tired machine on the same haul. What happens then if an extra minute is expended in trying to obtain additional yardage? If 1.6 cu.

yd. more can be loaded by a tractor and scraper combination, the result is a stand-off. On the other hand the same time and load increase to the rubber-tired unit results in 104 cu. yd. per hour, a loss of 4 cu. yd. from the previous 108 cu. yd. or 3.7 percent reduction. The example points up a problem in percentages. To pay off, the percent gain in load must exceed the percent increase in cycle time that results from going after extra yards per load. Conversely, the percent reduction in load for a shorter load time must be smaller than the percent saving in cycle time.

Since every manufacturer's scraper varies to some degree from his competitor's, and since soils and loading power also vary, it is difficult to pinpoint a best loading time. Long experience has shown, however, that 1 minute is a good average maximum time. Occasionally conditions may make longer times practical, but most well designed modern scrapers will produce maximum yardage with a load time between ½ and 1 minute.

Use of Field Scales

For the future, I believe contractors will some day take up the use of field scales to establish optimum load times for each job and use this knowledge to take maximum production from their equipment. In the design and field checking of scrapers, manufacturers have been doing this. As I have said, scrapers and materials will vary somewhat but the general curve is interesting to study. With adequate loading power, if you assume the load obtainable in 2 minutes as 100 percent load, the relationship is approximately:

44% of maximum in 10 sec.
67% of maximum in 20 sec.
80% of maximum in ½ min.
87% of maximum in 40 sec.
91% of maximum in 50 sec.
94% of maximum in 1 min.
96% of maximum in 70 sec.
97% of maximum in 80 sec.
97.5% of maximum in 1½ min.
98% of maximum in 100 sec.
99% of maximum in 110 sec.
100% of maximum in 2 min.

This relationship may change from job to job, but whatever the specific curve for specific conditions, it is easy to see that the last few yards can be costly ones.

In conclusion, this science is a long way from being complete. No one knows all the answers. It is much like driving your own car, however. You will all agree, I believe, that you can travel farther in a day driving 60 mph than you can driving 30 mph. At the same time, more skill, more judgment, more attention to detail is required to average 50 mph than to average 25 mph. Push loading practices and wheel tractor speeds make it possible to use efficiently manpower and horsepower. They also offer a challenge to use them properly for lowest net cost per yard.

Rock Anchor Bolts Have Many Construction Applications

Capable of sustaining a 40,000 lb. pull-out in hard rock, a ¾ in. steel rock bolt with a forged anchoring head and expansion shield is now being made available for tunnel work and general construction purposes by Republic Steel's Bolt and Chain division.

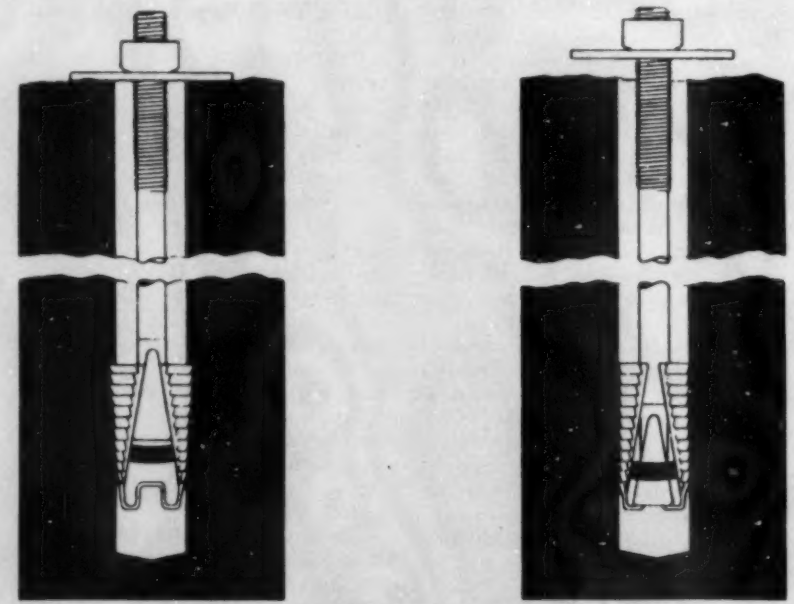
Developed originally as a "mine roof bolt," the bolt has passed tests for pull-out registering 10,000 lb. more than the showing of slotted type and square head type bolts with expansion shells. The bolt provides support by tying rock together. It is intended to provide maximum shoring safety in stratified and unstratified rock for ribs, walls and roofs in all types of tunnels, aqueducts, railroad and highway side cuts, building foundations, dams, etc. Used in proper number and patterns, the bolt will all but do away with the need for timber shoring, the company says.

The anchoring end of the bolt has a wedge head and shield; the exposed end is roll threaded. It can be obtained in stock lengths from 2 to 8 ft. or on order to any length.

To install, the bolt is inserted wedge end first to the desired depth in an anchoring hole just large enough to admit the shield. A square steel plate and a nut are placed on the threaded end of the bolt, which projects any desired distance from the hole. As the nut is tightened, the cone shaped wedge is pulled down through the inverted cone shaped shield, causing the serrated metal edges of the shield to spread out and anchor into the sides of the hole.

The hole into which the bolt is inserted need not be drilled to a predetermined length; it need only be longer than the bolt. This makes it possible to reset the bolt to a higher position in the hole when needed, an exclusive advantage. This is vitally important when steel strappings or wire mesh are laced between the bolts to prevent fractured rock from falling. By resetting the bolt, the strappings can be drawn flush with irregular roofs.

The forged wedge head type bolt is available in either high or low carbon steel.



● The bolt is inserted into a pre-drilled hole. As the bolt is tightened, cone-shaped wedge is pulled down through inverted cone-shaped shield, causing serrated metal edges of shield to spread out and anchor into sides of hole. The shield sheds the rubber washer (outlined in black) which temporarily held bolt before tightening.

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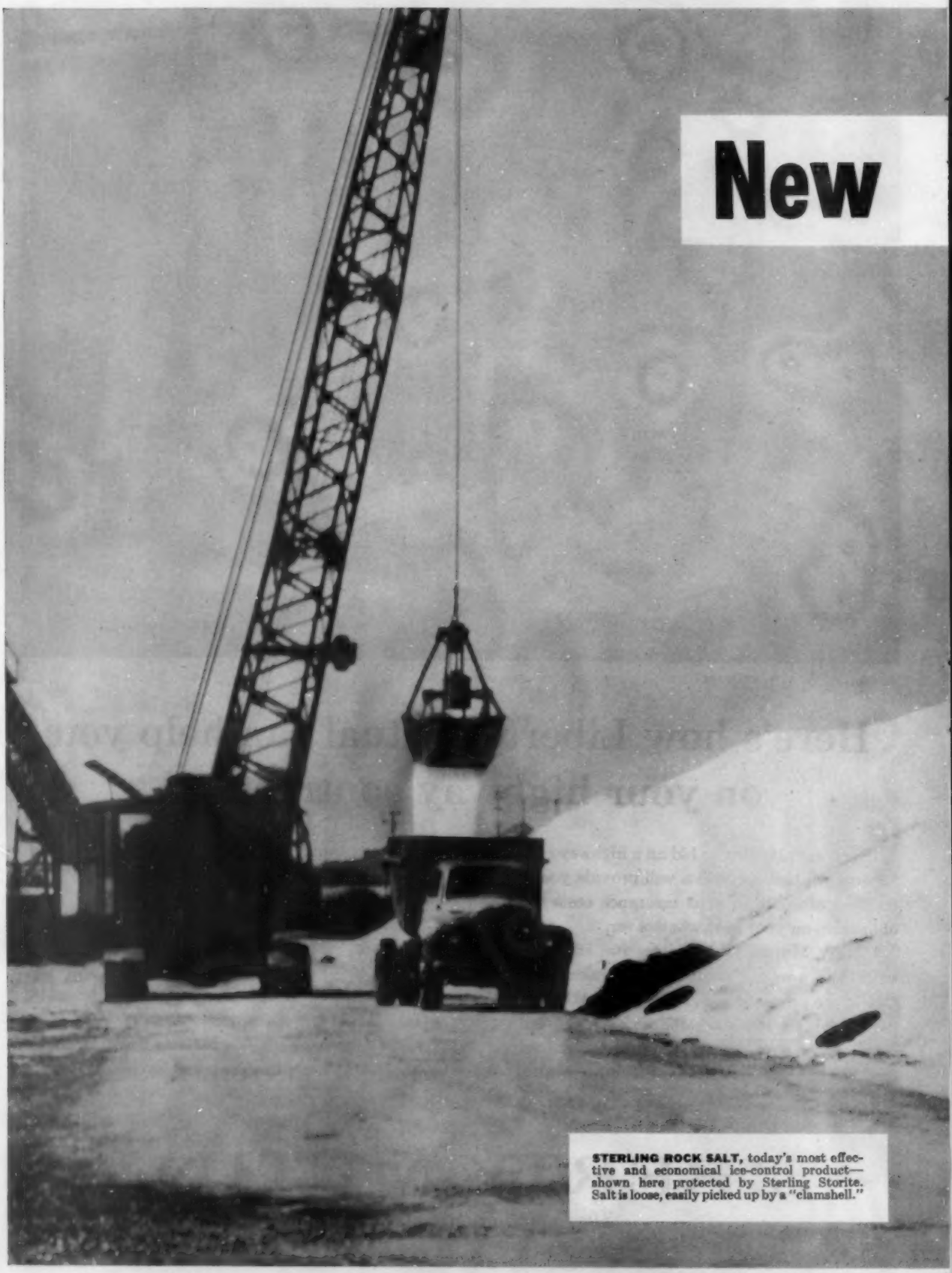

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Now you can order your ice-control rock salt early . . . store it at strategic roadside locations . . . have it free-flowing and ready for use when the first storm hits. New STERLING STORITE makes all this possible!

Sterling Storite is a new chemical agent developed especially to keep ice-control rock salt from caking in storage. Tested by cities and highway departments for more than two years, Storite has been found completely effective under all weather conditions. When added to rock salt, it forms a covering over each salt crystal . . . and actually prevents the crystals from adhering to each other!

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If you store your ice-control rock salt under cover—Sterling Storite is also effective in keeping it free-flowing. In fact, many communities and highway departments are already using Storite in sheds and silos to give salt additional protection against caking.

Other important features: This unique new chemical is easily applied to salt under cover or outside . . . to either large or small stockpiles. And Storite is economical to use. Just two pounds of this chemical will protect one ton of salt! Storite is non-toxic—won't harm skin, clothing or equipment.

This year, be prepared for icy weather. Order your Sterling Rock Salt now . . . and specify one 50-lb. drum of Storite for every 25 tons of rock salt. For complete details on application of Sterling Storite, as well as further technical information on this amazing chemical discovery, write for free illustrated booklet.

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PRODUCTS OF INTERNATIONAL SALT CO., INC., SCRANTON 2, PENNA.

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REVERSE CURVE SAFETY ARMS . . . for full 360° vision at all times with absolute personal safety for operator.

ALLISON TORQMATIC TRANSMISSION . . . for fast, easy shifting-*forward or reverse*-at full power without foot clutch.

STRAIGHT LINE HORIZONTAL THRUST . . . allows constant crowding of pile while maintaining full traction and steerage.

INDEPENDENT BUCKET ACTION . . . lets you fill buckets to heaping every time–even from windrows or low piles.

LOW LOAD CARRYING POSITION . . . gives greater stability—allows faster, safer travel with far less spillage.

FASTER TIME CYCLE . . . is the natural result of these features. Faster work means greater job profits!

TROJAN* TRACTOR SHOVELS

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2 & 4 Wheel Drive Front-End Loaders

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YALE & TOWNE

CONTRACTORS MACHINERY DIV., THE YALE & TOWNE MANUFACTURING COMPANY, BATAVIA, NEW YORK; SAN LEANDRO, CALIFORNIA

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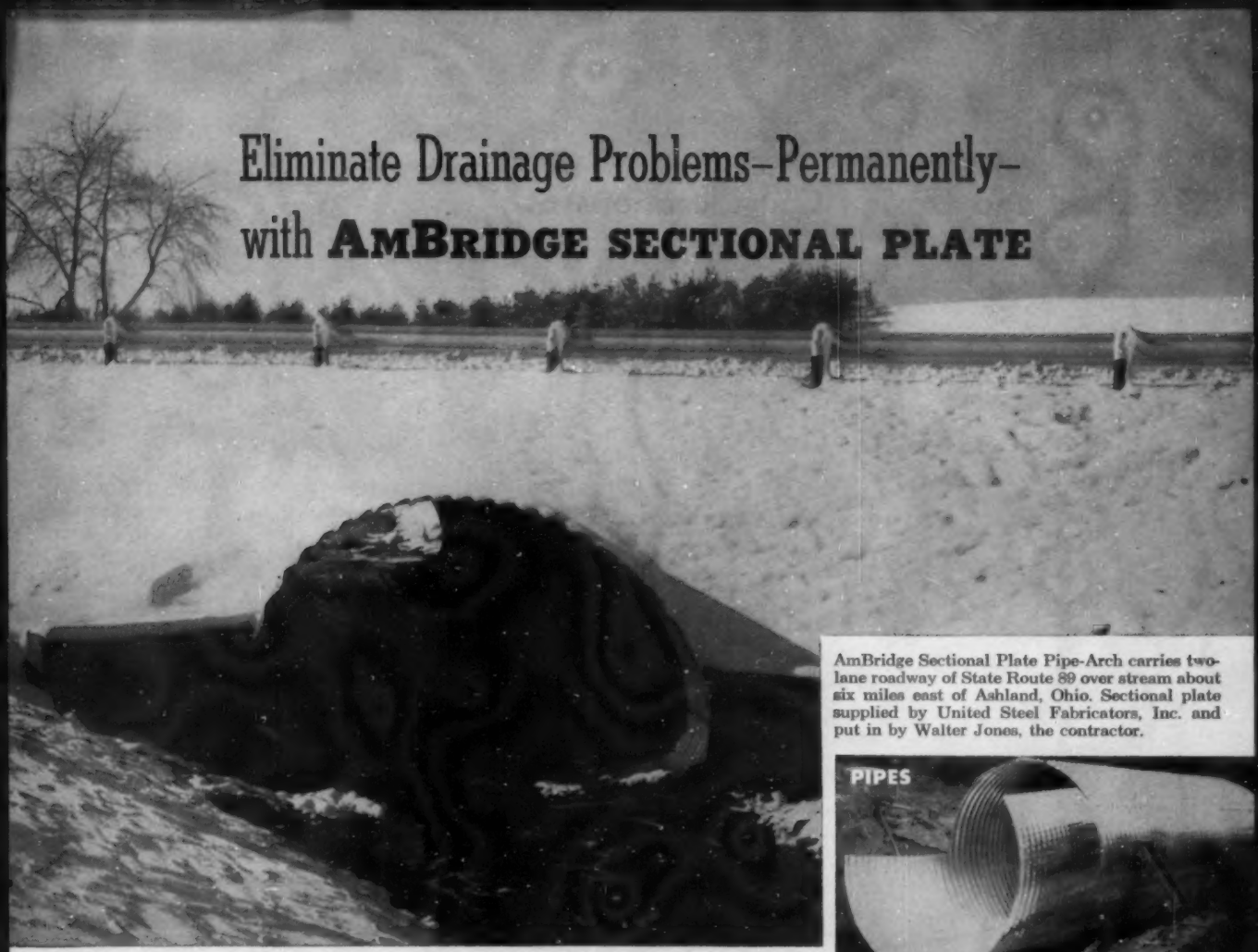
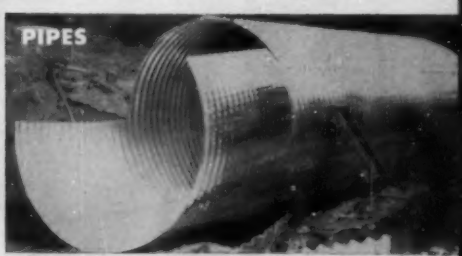
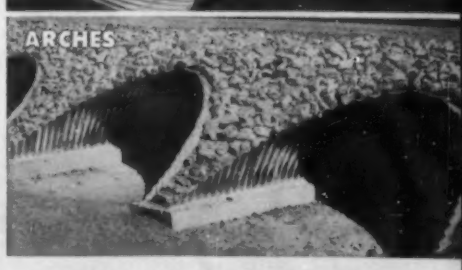
Eliminate Drainage Problems–Permanently–with AMBRIDGE SECTIONAL PLATE



AmBridge Sectional Plate Pipe-Arch carries two-lane roadway of State Route 89 over stream about six miles east of Ashland, Ohio. Sectional plate supplied by United Steel Fabricators, Inc. and put in by Walter Jones, the contractor.





USS AmBridge Sectional Plate Pipe, Pipe-Arches, and Arches are available in a complete range of standard sizes to satisfy the design requirements for *any* waterway opening. They are fabricated to meet all federal and state specifications.

These strong, flexible structures with their 6″ x 2″ corrugations can resist extremely large externally applied loads.

Special details such as asphalt coating, hook bolts for concrete headwalls, beveled ends, and skewed ends are furnished as specified for each job. These structures are economical (they eliminate the need for forms . . . and, being made of steel, there is no breakage). They are permanent (they can be extended whenever a fill or road is widened). They go in quickly with a minimum interruption of traffic.

For Culverts Made with USS Galvanized Corrugated Sheets

For your smaller drainage structures, culverts made from USS Galvanized Corrugated Culverts Sheets are available. For the names of firms making these top-quality culverts, write to United States Steel Corporation, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.

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NEW CATALOG NOW READY

Containing complete information on AmBridge Sectional Plate Pipe, Pipe-Arches, and Arches. Our new 28-page catalog covers design, sizes, weights, gages and assembly instructions. For free copy, just write our nearest office.

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AMBRIDGE SECTIONAL PLATE

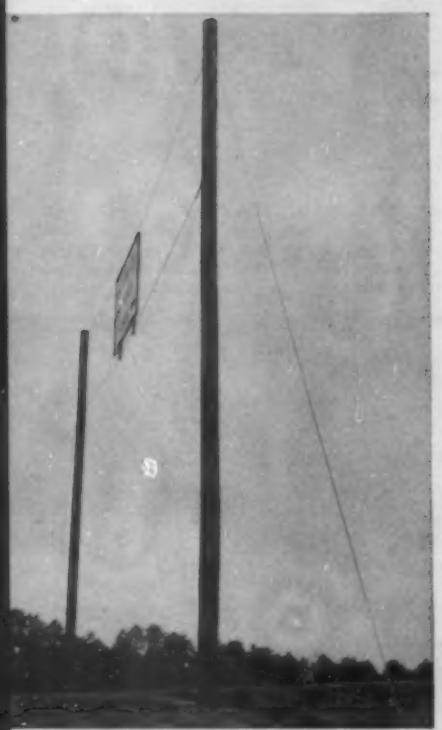
USS

7-829

UNITED STATES STEEL

Uses and Design Considerations of

Overhead Signs and Markings



● Viewed from the side, above, and front, below, is a span wire installation near Charlottesville, Va.

With the urban program underway you may profit from the experience of one of the highway departments that pioneered overhead signs.

By J. C. Bullock, Jr.

Associate Traffic and Planning Engineer, Virginia Department of Highways

IN MOST part, the interstate system of roads will be multi-lane divided facilities with few, if any, grade crossings and perhaps, as we have so often heard, no traffic signals. However, there is one familiar and important feature now in use on today's highways which will be seen on the new interstate highway system.

That is the traffic sign.

The functions of traffic signs are to regulate, to warn and to guide the driver. Though it is hard to classify all signs according to function, guide signs, such as route markers and those indicating destination, are usually thought of as assisting convenience and comfort, while regulatory and warning signs are essentially concerned with safety.

To assume that signs in place are necessary or useful is not enough. We must see to it that the signs convey a message to the driver which is necessary or at least useful to him. Assuming that the message is important, it must be seen and understood by the driver before he can react properly to it. We must always consider carefully the relationship of signs to the needs of the drivers who are to make use of them.

A great deal of thought is being directed toward signs which are more meaningful and better adapted to the demands of today's traffic. Thinking along this line has resulted in improved signing throughout the country. For example—the State of Virginia has found that the use of oversize warning and guide signs will reduce the accident rate at intersections or other accident-prone locations.

Highways ten years ago carried relatively light traffic volumes as compared to today's high volumes. The roadside development then was sparse when compared with today's heavy roadside development where the access is not limited. Traffic

From a paper delivered before the Traffic Engineering Section, Southern Safety Conference, Richmond, Va., March, 1957.

● **Photo taken at Routes 13 and 460 near South Norfolk shows cantilever type, at left, and two overhead truss installations, right.**

signs did not have to fight the keen competition of the variously colored, reflectorized and illuminated outdoor advertising signs that they do today..

Finding the proper place to erect these large signs where state owned rights of way are limited has, on occasion, resulted in problems. On multi-line roads, where traffic volumes were heavy, we had difficulty in getting the message effectively displayed for the driver on the inside lane.

Span Wire Installations

This resulted in our using a span wire installation for placing signs over the lanes of the roadway. The span wire installations, as a rule, consisted of two guyed wood poles with span wires between them on which the sign or signs were mounted.

The span wire installation for overhead signs, soon after being erected, would begin to sag and regardless of whether we used various types of bushings to compensate for the wire sag or did constant tightening of the guy and span wires and other maintenance, the span wire type installations never seemed to have the professional look desirable for highway traffic signs.

We have tried using mast arm installations which consisted of a steel pole and standard traffic signal mast arm. In most instances this type of installation did not prove to be substantial enough to carry the wind load. This resulted in the mast arm installation ending up on the ground or wrapped around the pole from which it was suspended.

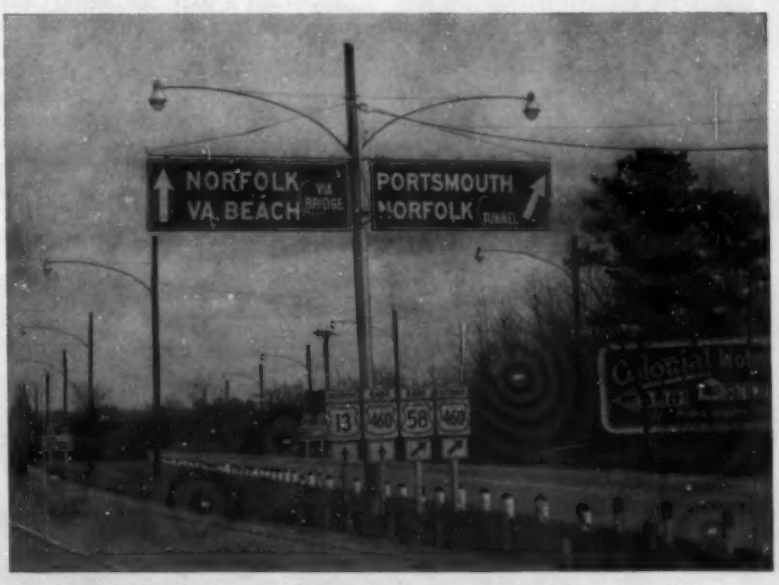
In some cases, though, we have attained success from the mast arm installations. This was done by using 2-in. extra heavy steel pipe for the mast arm, 2-in. steel pipe for the spreader arm and welding these items and the pole clamps to the steel pole.

Noting the need for a sturdy, eye-appealing yet inexpensive overhead sign truss, the Virginia department of highways, traffic and planning division, working with the bridge division, designed a steel truss for overhead signs which met the desired conditions.

The trusses have been used extensively throughout the state in lengths up to 88 ft. The truss is designed to resist 30 lb./sq. ft. of wind pressure or the equivalent of three signs each 10 ft. by 4 ft.

We have been using these trusses for about eight years. During this time we have had only one blown down. This one had been previously hit and structurally weakened when hurricane Connie struck with gusts of wind up to 135 mph. Other trusses in this same area were not disturbed even though some of them carried larger signs.

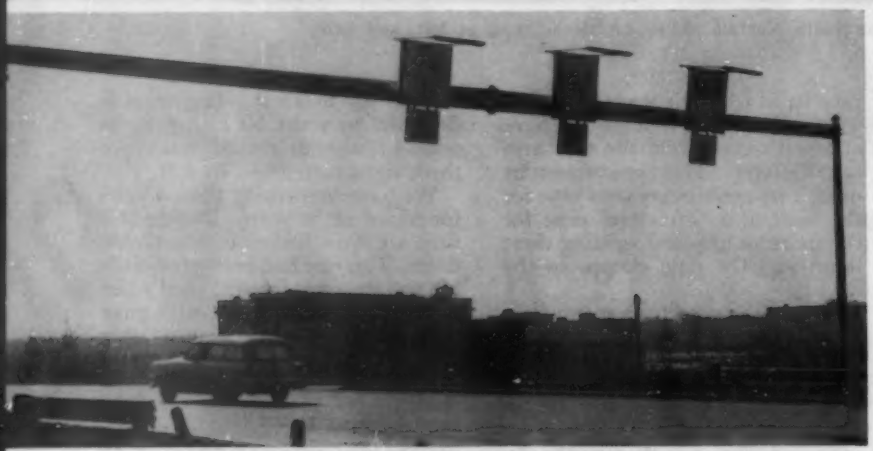
These trusses, in addition to holding the sign overhead firmly in an eye-appealing manner, have a tendency to attract the motorists' attention because of their unusual de-



● **Mast arm installation near Bowers Hill. This is the center mounted or "T" type.**

● Cantilever type unit on Route 29 north of Lynchburg.

● A cantilever sign installation in Martinsville. Driver's-eye view shows effectiveness of this sign placement.



● A Union Metal Monotube steel pole installation over Routes 1 and 350, Arlington county. Note fluorescent lighting over signs.

sign, with the result that he sees and is able to read a sign which he might otherwise have missed.

The trusses fabricated by the department of highways are relatively inexpensive initially and require very little maintenance. A truss with a 66-ft. span can be fabricated at a cost of $485 once you have made a jig on which to form your pipe. Our first truss, which had only about a 40-ft. horizontal clearance, cost us approximately $1,200.

There are on the market several overhead truss designs which are fairly common and have probably been seen at least in photographs by most of us. The two most commonly seen are those fabricated by the Union Metal Co., and Pfaff and Kendall.

The Union Metal Company utilizes two Monotube steel poles with cylindrically tapered steel beams over the roadway from which the signs are suspended. The beam is tapered 0.14 in. per ft. Wind loading is equivalent to 101.6 mph (26.4 lb./sq. ft. on projected areas of cylindrical surfaces and 42.24 lb. per sq. ft. on flat surfaces).

The double sign posts—span type—described above can be furnished in spans of slightly more than 81 feet.

Union Metal also manufactures single sign posts of both the cantilever and center mounted type. The wind loading on these is about the same as that mentioned for the span type. The cantilever type with a single mast arm is restricted by pole size to either 61 sq. ft. or 81¼ sq. ft. of sign area. The cantilever type with the two mast arms, depending on pole size, can support signs with a maximum allowable sign area of 97 sq. ft. or 182 sq. ft.

Same Wind Loading

The center mounted or "T" type single post design has the same wind loading as the other two types. The maximum sign size on this type of installation, here again depending on pole size, ranges from 61 sq. ft. to 120 sq. ft.

The Pfaff and Kendall Co. fabricates trusses for sign suspension similar to those just discussed, except that aluminum is used instead of steel and the trusses are fabricated to suit the site at which the truss is desired.

The price of these Union Metal

● Overhead sign truss, with proper spacing of signs, on Routes 13 and 460, Norfolk county.

and Pfaff and Kendall trusses varies beginning at about $500 and spiralling upward. The aluminum, of course, running much higher than the steel.

More substantial and much more costly overhead sign installations have been made than those already discussed. However, the benefits derived from these installations are probably not proportionate to their cost. One prime example of this is the brige for sign suspension over the approach to the new Delaware river bridge in Delaware.

The cost of this installation was in the neighborhood of $25,000. The cost to erect and paint the structure was $3,675 and the two internally illuminated signs cost $5,209. This installation has a 70 ft. span with two signs 5x22 ft. each.

The Highway Research Board committee on uniform traffic control devices has foreseen the importance and desirability of establishing a standard for overhead sign trusses and has appointed a subcommittee on supports for traffic control devices.

Not Yet Official

These standards are only recommendations and have not as yet been officially adopted. Those of you working on an overhead truss of your own design might use these as a starting point. We in Virginia are now reviewing our truss design to determine if it will meet the demand for longer spans and larger signs.

The design of the overhead traffic sign is most important and, like the shoulder sign, has crept upward in size. Messages have been displayed in a large variety of ways.

These signs have been made with reflectorized sheetings as backgrounds and from cut-out letters of aluminum with reflectorized buttons, plain paint illuminated with incandescent and fluorescent light, neon tubing, internal illumination of plastic letters and of plexiglass on which the message has been painted.

Regardless of the type of material from which the sign is made, brightness and legibility are the two factors in which we are most interested. These two factors are important both day and night; however they are most important at night.

More Crashes at Night

This is pointed up by the fact that the hour of occurrence of traffic crashes does not follow the traffic volume curve, although the traffic peak in the late afternoon is matched by a peak in crashes. Traffic volumes fall off after dark much faster than do crashes. Of the 735 fatal crashes in Virginia in 1955, 386, or 52.5 percent, occurred in hours of darkness, and 41, or 5.6 percent, in dusk or semi-darkness. Night traffic volumes are approximately one-half of the daytime volumes. Approximately half the total fatal crashes occur during hours when only one-third of the total traffic is moving and this definitely indicates the hazards of reduced visibility.

We have all observed signs which offered excellent visibility and legibility during the daylight hours but whose effectiveness sank with the setting sun.

There have also been installed overhead signs made from neon tubing, and signs with fluorescent internal illumination which carried messages so small that their cost could hardly be justified, since they were impossible to read.

Virginia has been in the overhead sign field probably as long as any state and has just begun to grasp the full importance of letter height and series, spacing between letters

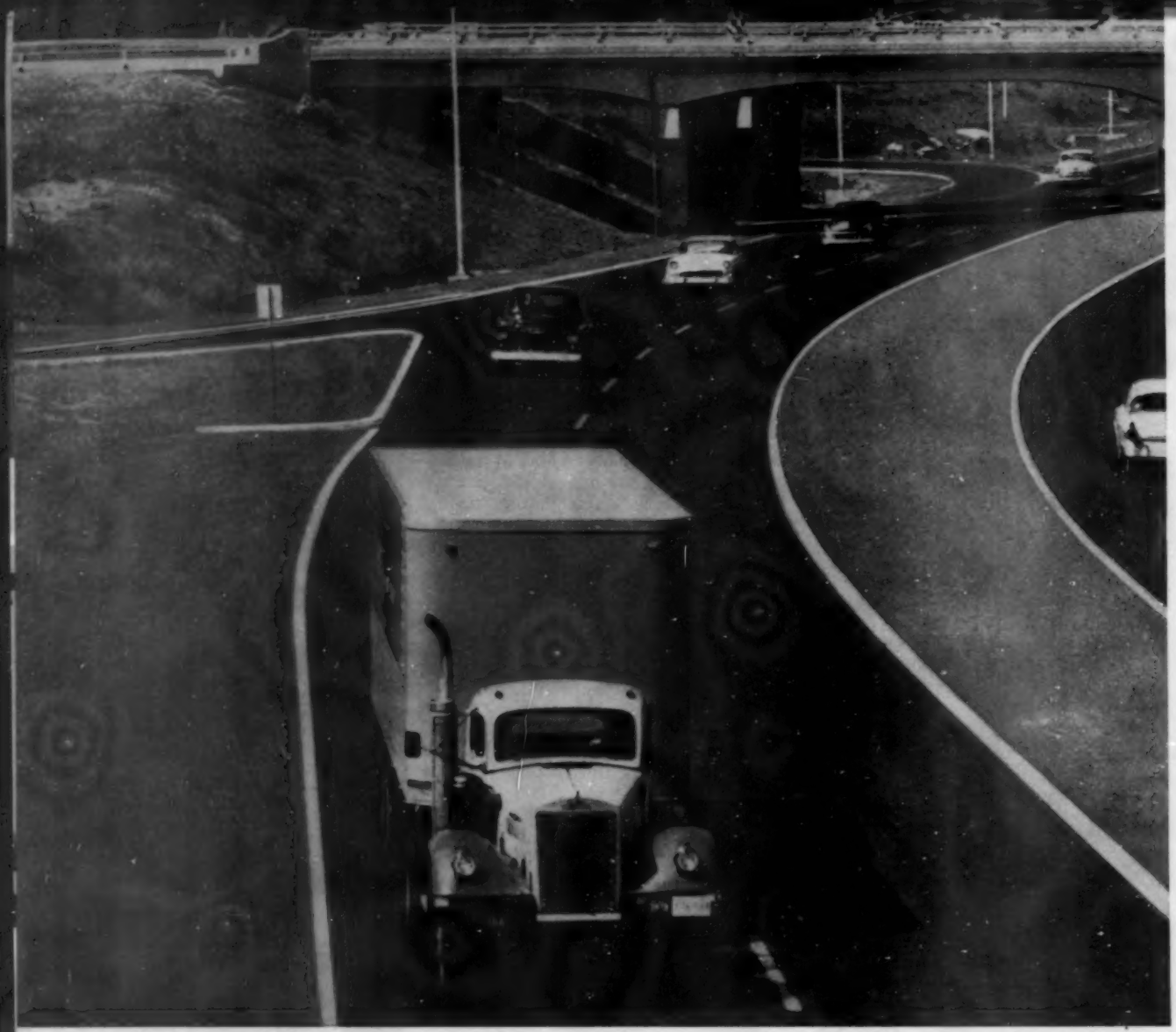
● **Truss over Route 13, Norfolk county. Note Steber light units with small flood lights.**

and lines of copy, and illumination. We have tried using cut-out letters with reflectorized buttons, reflectorized sheetings, neon signs and plain painted signs with black on white and white on black, illuminating them with goose-neck incandescent lamp fixtures and Steber light units with small flood lamps.

Experience with reflectorized sheetings and cut-out letters with buttons for use in overhead signs

(Continued on Page 116)

● **Above and left: two views of Pfaff and Kendall aluminum truss over Route 301 at Bowling Green.**



Modern ASPH

the most economical distance between

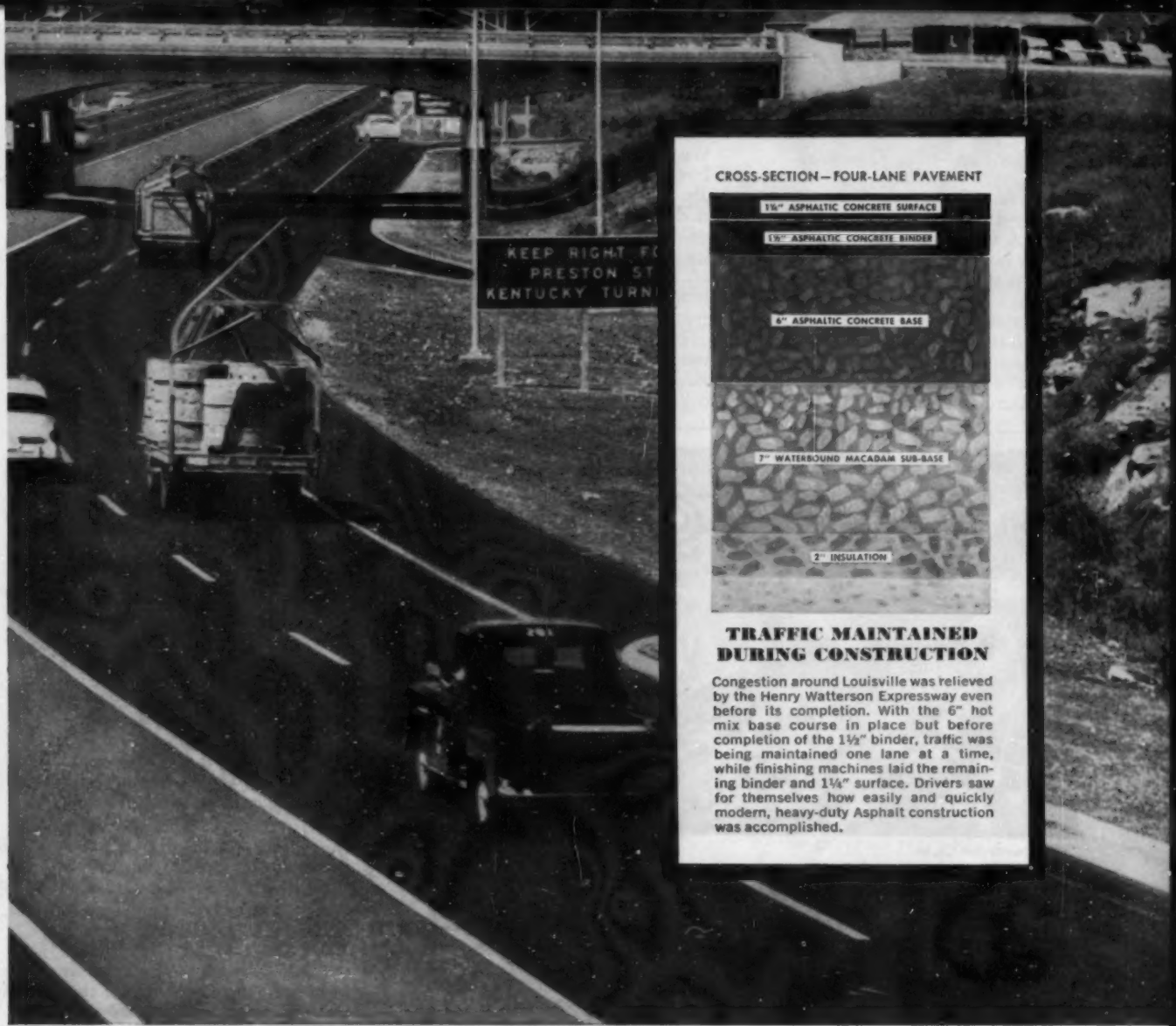
Builders of Louisville's Henry Watterson Expressway know the *economy* of modern Asphalt construction.

The cost of this heavy-duty Asphalt surfaced pavement, 17¾ inches in depth, was $3.88 *per square yard*. That's dependable, low-cost highway!

Cut Costs! In face of the unexpectedly large increases in road-building expenses, the low cost of Asphalt construction becomes more important every passing day!

So does the fact that Asphalt pavement is so fast, easy and inexpensive to maintain and widen. For even the brand-new highways we are building today may themselves need widening and strengthening due to unforeseen *future* loads and traffic increases.

Save Tax Dollars — With modern Asphalt



CROSS-SECTION—FOUR-LANE PAVEMENT

TRAFFIC MAINTAINED DURING CONSTRUCTION

Congestion around Louisville was relieved by the Henry Watterson Expressway even before its completion. With the 6" hot mix base course in place but before completion of the 1½" binder, traffic was being maintained one lane at a time, while finishing machines laid the remaining binder and 1¼" surface. Drivers saw for themselves how easily and quickly modern, heavy-duty Asphalt construction was accomplished.

ALT construction:

two points!

construction you provide more strength, more length, more width for the tax dollar. You provide roads that stay rugged yet resilient for generations . . . Roads that are quiet, smooth-driving, safe. Seamless, glare-absorbing, skid-resistant surfaces. With lane markings that are easier to see day and night.

THE ASPHALT INSTITUTE, Asphalt Institute Building, College Park, Maryland

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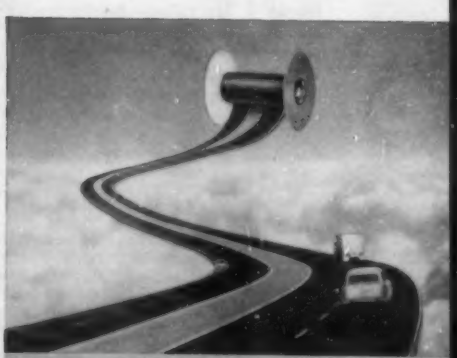

Ribbons of velvet smoothness . . .
MODERN **ASPHALT** HIGHWAYS

OVERHEAD MARKINGS

(Continued from page 113)

has not been too good. On most of our highways, where overhead signs are used, the traffic volumes are extremely heavy and driving with low beams is the rule instead of the exception. Therefore, regardless of whether the sign was erected at an angle to the road or perpendicular, the message was not as effective as we felt it should be, considering cost. Accordingly, nearly all of the overhead signs throughout Virginia are illuminated.

We wanted something entirely different from our usual signs and traffic signals to advise motorists that drawbridges were open. Since we did not have any neon signs in place on our roads, we have used neon lights for getting our message over to the motoring public. These signs have performed admirably wherever they have been used. There was one location where the setting sun shone in the driver's eyes and into the sign in such a manner as to reduce the effectiveness for a short period. This condition was relieved at least in part by the removal of a clear plexiglass cover which we had over the message. These overhead signs are 12x5 ft. in size and messages are in 18- and 12-in. "D" series letters formed from double red 10 millimeter neon tubing.

Selection of letter height and series is as important as letter spacing and spacing between lines of copy. The message and maximum desirable sign size are things to be considered first and often control the letter height and series to be used. However, it is our feeling that not less than 15-in. "D" series letters should be used on overhead signs and, when possible, a large height letter.

Wording of Message

The construction of the message is considered next. If the background is dark, the letters should of course be light and the stroke of the letter need not be as wide as when the background is light and the letters dark. This is due to the fact that the eye sees a spreading of the white at levels of brightness greatly exceeding the level to which the eye is adapted. This spreading of the white is known as "irradiation." White letters improperly spaced with a wide stroke will blend together while narrow stroke black letters and a white background will tend to be blotted out.

"The "D" series letter is probably as near to a "standard" series that we can come and the one we most commonly use.

The illumination of these signs can be accomplished in any number of ways. We have done away with the old gooseneck type of light almost entirely and are using the Steber light units with the baby flood lamps almost exclusively. However we are constantly on the lookout for new types of illumination such as the tube lights which provide excellent light.

The Virginia Council of Highway Investigation and Research (a cooperative organization sponsored jointly by the Virginia department of highways and the University of Virginia) is now planning to study overhead signs in the field. These studies should prove beneficial to us in providing the motorist with a sign that is bright and legible and at the same time give him the most for his tax dollar.

Overhead traffic sign installations are slated for greater use.

©Morrison-Knudsen Co., Inc.

BATTLE WITH STUBBORN ROCK AT THE DALLES DAM RESERVOIR . . . A JOB FOR BRUNNER & LAY ROK-BITS

A 14-mile railroad relocation around The Dalles Dam reservoir called for moving 1,400,000 cu yd of basalt rock. Despite difficulties, Morrison-Knudsen moved a steady 6,000 to 7,000 cu yd in two nine hour shifts.

Brunner & Lay carbide Rok-Bits drill round, easy-to-load holes—provide better chip clearance—with bit working in rock, not its own cuttings—and offers deep seated, generous carbides that stay put to give you big daily yardages at lowest cost.

Brunner & Lay Rok-Bits and drill steel used on the wagon drills kept ample rock ahead of the shovels. For details on this and other important low-cost Rok-Bit blast hole drilling jobs, call our nearest office. Ask for NEW catalog #756.

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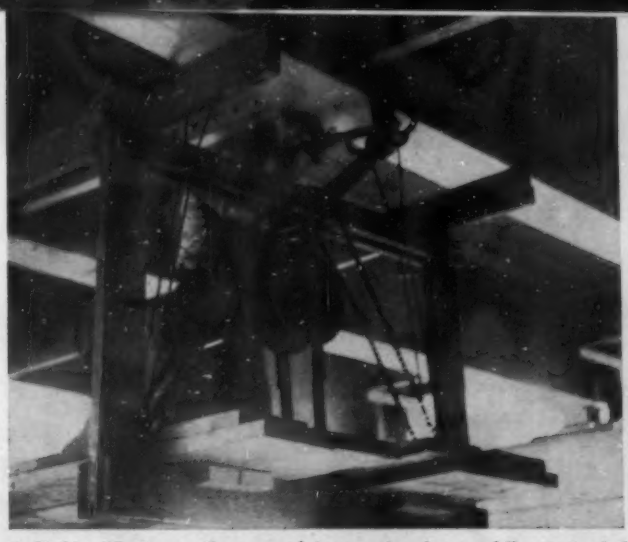
For more details circle 250 on enclosed return postal card



● (Left): Moving trolley around intersecting beam while carrier is held by suspension device. (Right): Workman applying waterproof tape to form joint.

Form Stripping Platform Suspended from Trolley

A NEW suspension system for a form-stripping unit was developed by a bridge contractor on the Detroit-to-Toledo Expressway project in Michigan. The unit was used to remove plywood forms from under concrete deck on the River Basin bridge in early 1955. This bridge is of structural steel design with typical concrete roadway slab.

As reported in an issue of Michigan *Roads and Construction*, this contractor, Walter Toebe & Co., Lansing, Mich., designed the unit so that it could be moved around intersecting beams without complete removal and reinstallation of the unit. Primarily, it consists of a stripping carrier suspended from a trolley which rides on the lower flanges of the floor beams. For quicker movement around intersecting beams, Toebe added a detachable secondary suspension device for holding the carrier just below the beam, to which it is hooked while the trolley is being removed and reassembled on the other side. The contractor also added some refinements to the trolley itself for quicker knocking down and assembling. These features helped do a faster, cleaner job, and resulted in man-hour savings for the contractor.

Another time and money saving technique on this job was the use of waterproof tape for sealing joints in the forms. Pres-Stix tape, 2¾ in. wide, was applied to the narrow space between beams and plywood forms, replacing notched form lumber which would have required an estimated 66,000 notches around reinforcing bars. Thus the tape not only replaced costly notched form lumber, but also its cumbersome installation and removal. This tape came in 180-ft. rolls and was peeled off much like adhesive tape; application was performed rapidly by nonskilled labor. Savings were said to be reflected in reduction of time required for installation, difference in cost of materials and labor, and elimination of chipping or cleaning material.

Soil-Cement Gains 34 Per Cent

There was 7 million square yards of soil-cement street construction awarded last year, a gain of 34% over 1955, according to Portland Cement Association.

All types of soil-cement work awarded during 1956 totaled 25,100,000 square yards, or 15% above the previous year's figure.

Prefab Forms Save 100 Days on Oregon Bridge Job

A contractor who was given 320 days to pour 4,000 cu. yd. of concrete for a bridge over Myrtle creek on U.S. Highway 99 in Oregon, expects to complete the job in less than 220 days, or only ⅔ the time allotted to him in his contract.

That is the story told by Harry Pajutee, chief engineer for the contractor, Lee Hoffman, Beaverton, Ore. Pajutee credits this saving largely to the ease of erecting and stripping Symons standard high-strength forms. These forms shortened pouring time, reduced the number of men required and provided greater mobility for the pouring equipment. Only 3,144 sq. ft. of panels were required for the 160,000 sq. ft. of forming.

● Tubular scaffolding and standard factory-built form panels helped this bridge job move along.

Deep Snow in the Mountain Passes . . .

Blizzards in the Eastern Plains . . .

How Colorado's Snow Fighters Work

By Frank E. Merchant

Information Officer, Colorado Department of Highways, Denver

This state's snow clearing and emergency service have been greatly stepped up since the War by means of a flexible organization, introduction of radiotelephone, heavier equipment and more of it. Still greater mobility of heavy equipment is one of the current goals.

One of a Series of Reports on Winter Maintenance Procedures

DURING the early 1957 months, four major blizzards, added to drought-breaking precipitation, called for utmost effort from the 800 maintenance workers of the Colorado department of highways. It was the hardest winter, over-all, since the department started (after World War II) keeping 21 mountain passes open the year around on the 8,000-mile state road network, according to chief engineer Mark U. Watrous. The snow removal cost for the season was about $650,000, compared with $500,000 for an average recent winter.

During the 1957 spring blizzards, wind-driven snow forced the crews to keep reopening highways. Some supervisors and crewmen worked as long as 48 hours without rest. The repeated storms kept the forces on the alert seven days a week from mid-January to early April.

(Continued on Page 125)

Sylvania's Silver White is the most efficient general-purpose mercury vapor lamp ever made—provides up to 20% more light at no extra cost.

Sylvania gives you more light for less money with Mercury and protects your lighting investment, too!

You get top lighting performance and value when you use Sylvania Mercury Vapor lamps. Sylvania's Silver White lamp, for example, is the most efficient general purpose mercury lamp ever made.

The Silver White lamp actually delivers as much as 20% more lumens of light than previous color-improved lamps of equal wattage . . . yet costs no more to buy—or use.

Equally important, your lighting investment is protected when you install Sylvania Mercury Vapor lamps —thanks to Sylvania's liberal formula for guaranteed service. You're protected by Sylvania's policy that stands behind every lamp you buy.

Let your local Sylvania representative discuss your present and future street lighting needs . . . let him demonstrate the superior service and economy features of Sylvania Mercury Vapor lighting which your community can enjoy. Call him today, without obligation—or write:

SYLVANIA ELECTRIC PRODUCTS INC.
Lighting Division, Dept. 7L-7208,
60 Boston Street, Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
Shell Tower Building, Montreal

SYLVANIA

. . . the fastest growing name in sight

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

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Suburban shopping center parking area is "easy rolling" for
BUFFALO-SPRINGFIELD
Standard-Duty Tandems

Above: A Model KT-15A8 follows a paver at Indianapolis' Eastgate shopping center. *Right:* Compacting 2" asphaltic concrete wearing course with an 8-10 ton Buffalo-Springfield Standard-Duty Tandem.

Shumaker Brothers Industries, Inc., contracted to pave the roadways and parking areas for Indianapolis' new 66-acre, $7,500,000 Eastgate 56-store shopping center.

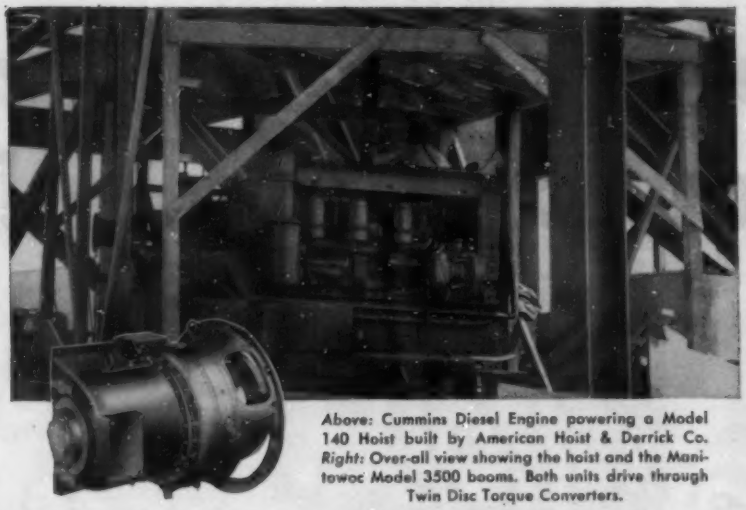
The paved area of 128,000 sq. yds. required 43,400 tons of stone, 14,080 tons of asphaltic concrete, and 40,000 gallons of MCO liquid asphalt. Total depth of roadways is 10", parking areas 8". For the fast, efficient compaction of the stone base and the 2" asphaltic concrete wearing course, Shumaker relied upon his Buffalo-Springfield Standard-Duty Tandem Rollers.

Standard Duty Variable-Weight Tandems are available in 5 sizes: 5-8, 6-9, 8-10, 8-12 and 10-14 tons. Outstanding design and construction features include: choice of highly efficient gasoline or diesel power • finest adjustable bevel gear final drive • single power unit assuring precision alignment of final drive, engine and transmission • popular torque converter drive for speeds up to 5.6 mph. • jig-assembled, specially stressed all-welded frame • compact, low-pressure hydraulic steering • and adjustable, tapered roller bearing yoke and king pin assembly.

Contractors the country over use Buffalo-Springfield Standard-Duty Tandems . . . the finest rollers, for the dollar invested, on the market today. Before *you* buy, check their job-tested, proven-better features for road roller performance, economy, reliability and efficiency. Ask your Buffalo-Springfield distributor for details, or write for Bulletin S-68-R 157 now!

BUFFALO-SPRINGFIELD ROLLER CO.
DIVISION OF KOEHRING COMPANY · SPRINGFIELD, OHIO

. . . for more details circle 252 on enclosed return postal card



Above: Cummins Diesel Engine powering a Model 140 Hoist built by American Hoist & Derrick Co. *Right:* Over-all view showing the hoist and the Manitowoc Model 3500 booms. Both units drive through Twin Disc Torque Converters.

How heavy-duty torque converters lend "gentle touch" to steel erection

At ALCOA's Warrick Works, now under construction near Evansville, Indiana, bystanders are daily witnessing two steel erecting machines performing with all the grace of an accomplished ballet dancer . . . and doing it with loads up to 29 tons!

The machines are part of the equipment operated by John F. Beasley Construction Co., Chicago. One is a Model 140 Hoist manufactured by American Hoist & Derrick and equipped with a Cummins Diesel Engine and a Twin Disc Three-Stage Torque Converter. The other is a Manitowoc Model 3500 erecting crane with a Caterpillar D17000 Diesel Engine and a Twin Disc Three-Stage Torque Converter.

The two erecting machines are working on 16-story structures for a power plant. The work requires very delicate steel setting . . . such as setting 17-ton cross members between columns and then, with a steel ball weight, gently tapping them into place.

As E. J. Delahousay, of John F. Beasley Construction Co., puts it: "With Twin Disc Torque Converters, you can swing fast . . . and lift without fear of engine stall. They make the machines handle easier and enable the operator to place his load just where it has to go!"

Twin Disc Torque Converters are excellent for delicate holding and inching of loads through simple throttle manipulation. Besides this, however, they prove their worth in many ways . . . such as permitting engines to operate in their most efficient speed range at all times, with full hp output available whenever required . . . automatically matching engine torque to load requirements . . . cushioning out destructive shocks and vibrations between driving and driven equipment . . . and holding constant tension on cables, for greatly increased cable life.

Be sure to specify a Twin Disc Torque Converter with your next new excavator, crane or hoist. They are available in both three-stage and single-stage designs . . . from 30 to 1000 hp in capacity.

Twin Disc Clutch Company, Racine, Wisconsin; Hydraulic Division, Rockford, Illinois.

TWIN DISC

TWIN DISC

Torque Converters

. . . for more details circle 357 on enclosed return postal card

The Big Fleets buy than any other make!

New Heavy Duty trucks offer you a choice of four modern Short Stroke V-8 engines—178 to 212 horsepower.

Why?...because on-the-job performance and low operating costs prove FORD trucks cost less!

Take a tip from the men who buy trucks every year. Official truck registration data for the past two years shows that owners of America's biggest commercial truck fleets have bought more Ford trucks than any other make!

Contractors and suppliers engaged in heavy construction work have found Ford trucks are best for their fleets. To begin with, Ford's initial costs are low. Many models are priced below all competitive makes.

FORD TRUCKS COST LESS

more FORD TRUCKS

Ford's Tilt/Cab Models are big in power, in capacity . . . up to 212 hp. Six series provide GVW's from 18,000 lb. to 30,000 lb., GCW's to 60,000 lb.

For example, the new Ford Tilt/Cab models are America's lowest-priced!*

And it costs less to run a Ford truck! Thanks to modern Short Stroke power and sturdy chassis construction, operating costs and "shop time" are reduced. Another important Ford plus is longer truck life—a fact certified by independent insurance experts.

Add it all up—you'll find Ford trucks do cost less! Contact your Ford Dealer . . . let him show you why the big fleets are buying more Ford trucks than any other make.

**Based on comparison of manufacturers' suggested retail prices*

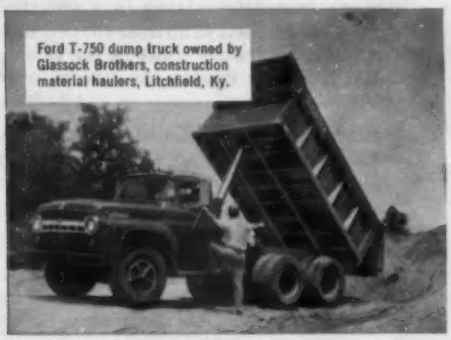
Here's what 1957 Ford truck users have to say . . .

Ford T-800 tandem dump owned by Goldring Trucking, construction material haulers, Fort Worth, Texas

"I've used Fords ever since 1935. I like Ford trucks because of the punishment they'll take. In my estimation, Fords are cheaper to operate," reports P. A. "Pete" Goldring, owner.

Ford F-600 dump platform owned by A. Teichert & Son, Inc., general engineering contractors, Sacramento, California

"We've been using Ford trucks for more than 10 years. They have been called on repeatedly for 'out-of-their-class' performance and have stood up very well," says Walter C. Petersen, supt. of equipment.

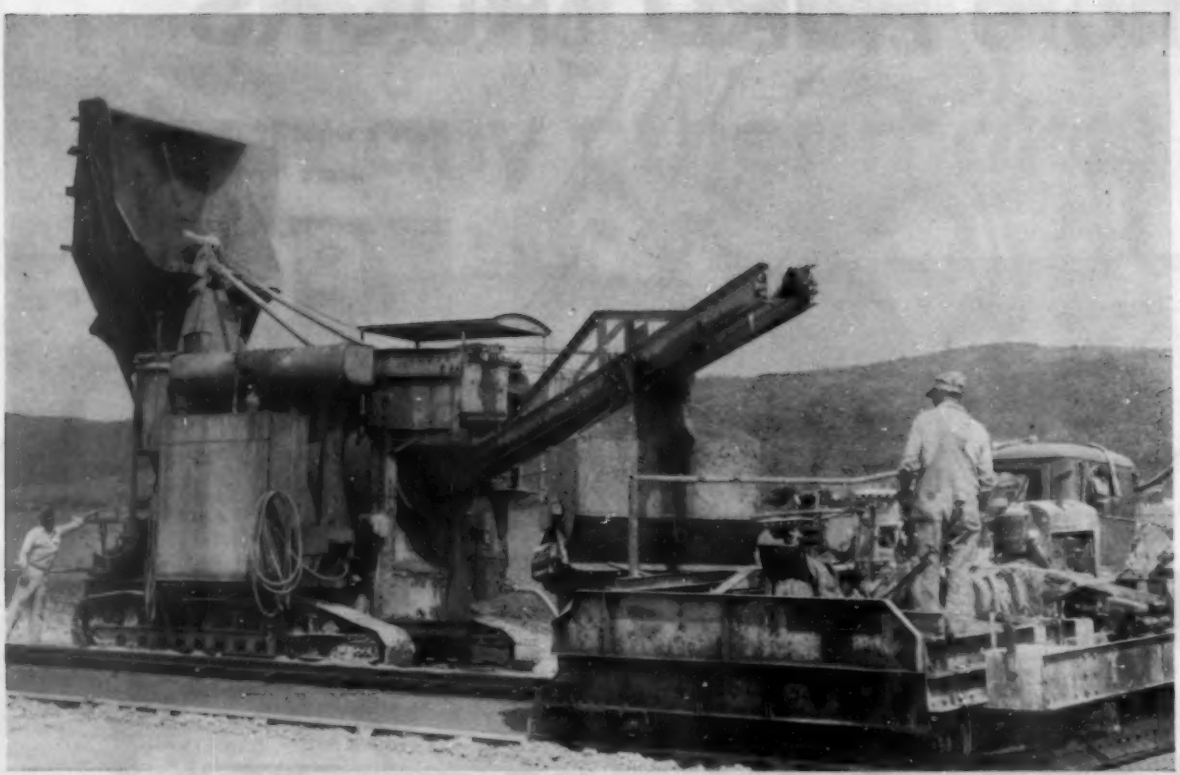


Ford T-750 dump truck owned by Glassock Brothers, construction material haulers, Litchfield, Ky.

"In comparison with other makes we've used, this Ford is as good a handling truck as you can buy. Our Fords are long-life trucks and they give us real service," says T. W. Glassock, partner.

LESS TO OWN — LESS TO RUN — LAST LONGER, TOO!

. . . for more details circle 285 on enclosed return postal card



Blaw-Knox MultiFoote Paver with Hydraulic Controls gives you more complete mixing in a shorter Mixing Cycle

You will be sure of higher production for hour-after-hour and day-after-day when you have a Blaw-Knox MultiFoote working in your spread of paving equipment. Faster skip operation gets the batch into the mixer with no loss of time. Hydraulic controls of batch transfer and discharge give immediate response in the automatic cycle. Cone-shaped drums assure you of thorough mixing in a shorter time or more complete mixing in a specified time than is possible in the cylindrical-shaped drum of ordinary mixers. Hydraulic controls for raising and lowering the A-Frame enable the paver to get under overpasses, bridges or other low overhead clearances and at the same time give you the advantages of single-cable skip control with its high speed, simple reeving and low maintenance cost.

These MultiFoote advantages combined with spreading or spotting action of the hydraulic operated bucket and simplicity of Paver design with its get-at-ability and freedom from excessive number of parts assure better day-after-day performance with lower maintenance costs. MultiFoote Pavers are available as single or double drum models in the 34E size.

All Blaw-Knox Paving Equipment Job-Proved

Blaw-Knox "Complete Package" Paving equipment has become the first choice of contractors throughout the country. Contractors with a spread of Blaw-Knox equipment know that they can depend on its many tested and proved design features plus one distributor source for parts and service to keep their jobs on schedule. If you are planning to bid on concrete paving, plan to use the only line of equipment with experience—see your nearest Blaw-Knox Distributor today.

For more information on any of these units send for the following bulletins by number — MultiFoote, No. 2616; Road Forms, No. 2370; Finisher, No. 2517; Subgrader, No. 2227-R; Batch Plants, No. 2488; Spreader, No. 2485.

BLAW-KNOX

BLAW-KNOX COMPANY

Construction Equipment Division

44 Charleston Ave., Mattoon, Illinois

. . . for more details circle 248 on enclosed return postal card

COLORADO BLIZZARDS

(Continued from Page 118)

Superintendents of the department's seven maintenance sections declare that the 146 two-way radios mounted on their trucks, pickups and rotary plows were the key to successful effort and "life-savers," particularly in the long week-end snow and dust storm which hit Colorado's eastern plains starting March 22. Operations during this four-day period exemplify the life-saving and road-opening "Standing Operating Procedure" in Colorado.

The basis of this operation is the department's rule that a maintenance man's first duty is seeing that travelers are safe.

● The blizzard of late March, 1957, piled dust and snow on the streets of Springfield on U.S. 160 in southeastern Colorado.

● *Basic Organization.* The fundamental unit of the maintenance force is the two-man patrol, one member of which (the maintenance patrolman) is responsible for work and equipment. The patrols are approximately 25 miles long. Each patrol has its own garage with two light trucks and attachments, and its men can call by field radio or by telephone on section headquarters for aid from heavy equipment and additional manpower during emergencies. The maintenance patrol crews' job is to travel each mile of the patrol, making emergency and minor repairs to roads, bridges and signs. The maintenance man's 44-hour week is extended when emergency conditions start to develop.

Over the maintenance patrols are highway foremen acting as field directors. The Denver-based maintenance section, for example, extends from Loveland and Berthoud passes eastward in a strip 80 to 100 miles wide to the Kansas border. In this section there are five field directors—one for the mountain area and four for the plains. The other six sections are organized in like manner. The superintendents know the location of every piece of mobile equipment and every crew during the storm and so are able to shift machines even across section and district boundaries.

During these emergencies, the six district engineers usually drop road-building work and join their maintenance superintendents in the "command posts." In last March's plains blizzard, the engineer of the southeastern district, headquartered at Pueblo, was able to divert all his attention to the most eastern of his two maintenance sections.

● *Plane Reconnaissance.* The day the weather clears, administrative engineer Charles E. Shumate surveys the clean-up and directs location of isolated department trucks by plane. After the late March blizzard he spotted a "lost" maintenance patrolman whose radio was dead but who could still get his motor running. The man was plowing a 12-mile section of highway in the southeastern corner of the state which was cut off by huge drifts.

Shumate's aircraft was used in the plains blizzard of 1946 to drop messages and tools to the (then radio-less) maintenance men. The report he subsequently wrote recommended the present installation of two-way radios tied into the state patrol network. Since 1954, the department has received half the cost of radio purchases from federal civil defense funds. In the last three years, it has increased the number of the sets by 40 percent and is now putting 18 new ones into use each year.

● *Effective Procedure.* In all storm activities, the highway force acts as part of a team with its fellow-department, the state patrol. When snow blocks the road—or when, even without this accompaniment, snow or dust reduce visibility to zero—the patrol officers and highway workers block the public off from the danger area. The work then breaks up into four phases:

1. Highway and patrol men go into the blocked-off area and move any travelers found there to safety.

2. When visibility increases, even slightly, snowplows break through drifts into the area, leading the way for other equipment and for crews which will remove stranded vehicles from the highway. Truck-mounted radios also enable the highway and patrol authorities to send motor caravans through the partially cleared road section—as, on a single open lane. A plow- and radio-equipped truck will lead such a caravan and a radio-equipped truck will be at the end of the line; the two radios can thus guide and check on all the cars and trucks in the file. This method, used at intervals during last March's plains blizzard and during a later two-day "blow," got traffic through areas that otherwise would have been closed to all movement for 48 hours.

3. Through the storm period, the maintenance men work at keeping open lanes through the drifts and widening them. In the after-storm period, the work is carried through to clearing the road surface entirely of snow. Meanwhile, snow-packed highways are sanded as a safety measure.

The use of large truck-mounted spreaders on the mountain passes has proven very effective in the last four years. The department now has 26 of the tailgate mounted type and 37 truck-mounted, in addition to 26 salt spreaders and 100 spinner type sand spreaders.

4. During and after the road-clearing phases, department personnel cooperate with the state patrol and with county and other local authorities in tending to emergency calls relating to situations off the state system. Quick and careful checking of such calls is needed

Colorado Mine and Ranch Roads Also Need Plowing

An International TD-18 crawler tractor with dozer blade clears a mine-access road in the Climax-Kokomo area of Colorado. Working from the 10,800-ft. level to the mines, located at 11,500 ft., a distance of two miles, the unit cleaned depths that sometimes reached 14 ft. M. L. Dubois, owner of the TD-18, does dozer work for oil companies and mines in this area.

so that the department may render aid where it is really necessary but not waste its efforts or exceed its functions.

● *Better Communications.* The state department staff realizes it must keep improving and extending its communications net, to keep the traveling public away from dangerous storm areas, to locate points where its efforts are needed, and to direct its work.

In the past two years, since the department's central offices have been grouped in a new building in Denver, its information service has been part of a teletype circuit which gives road information instantly to wire services, newspapers, radio and television stations. The seven maintenance superintendents report road conditions to the public relations office every morning and, as highway hazards develop, throughout the day, so that these conditions may be relayed over this tele-printer circuit. The state patrol and U.S. weather buerau reports are also put on this tele-printer—with the patrol particularly reporting emergency conditions during nights and weekends. Radio newscasters' use of this service has been of great value in warning motorists away from dangerous areas, especially during the winter just past, and should be credited with life-saving value, department officials believe. They are aware that constant vigilance over this reporting system is needed to keep it efficient.

Because the two-way radios are on the state patrol frequency, they are sending long-range messages on a crowded channel, which is also used by the state game and fish department, civil defense, county sheriffs and school buses. The field radios can communicate, but they may have to wait their turn to get onto the patrol net in trying to reach district and central headquarters. The department of highways has an unused channel assigned to it by the FCC, and long-range plans have been proposed for its own radio net, with microphones on the desks of its executives.

Radios do go "out" in storms, and not all highway workers can be equipped with sets, but the workers know how to get to the telephones in their sections. Here again, the invaluable telephone operators work in routing calls around districts where lines are down, as well as supplying information about their areas to the department.

The "punch a path and then widen it" theory of highway clearing works as well on Colorado's mountain passes as on its plains. The department's 21 passes—once closed all winter—now are never closed for more than 30 minutes to a few hours at a time. Snow overloading of the avalanche fields coupled with high winds, however, closed Wolf Creek Pass (south central) for a week during February. Maintenance installations were damaged by the slides and both regular and temporary employees won commendations.

● *Avalanche Experience.* In the seventh year of its avalanche control program—the only one organized by a state highway department on this continent, Colorado brought down more imminent avalanches with gunfire than ever before with three 75-mm. howitzers.

It also had more slides to contend with, all over the state, than any man could remember. On one day, 40 slides were counted in the state coming down naturally, and no one was hurt. During the whole winter, three traveling vehicles were hit by a slide—but without a fatality.

The death of one maintenance employee and a photographer during the shooting down of an exceptionally heavy slide, emphasized the dangers of avalanche control duty.

In continuing this program, the Colorado state department also plans to keep increasing its summertime installation of snow fences in avalanche fields, since these have

● "A" plows mounted on 5-ton trucks were workhorses of the recent Colorado storms, both for opening traffic lanes and for following the rotaries.

proved successful in reducing snow overload on the slides during the winter.

• *Plowing Routine.* Heavy slides and snowdrifts are cut through first with rotary snowplows. Of these plows the department has 25, 19 of new type and the remainder of an older style that is being replaced. These are fixed mounts on 5-ton trucks.

The seven maintenance superintendents agree that "A" plows, mounted on the department's 104 diesel trucks of 5-ton rating, are the indispensable workhorses for bucking through snow and handling everything but the heaviest drifts.

Rotary wings are available for attachment to all these trucks, and are being used in all areas for widening paths through the snow. The "rotary wings" are in their third year of use by the department.

In the total mobile force of the department available for use against storms are 648 other trucks of 1 ton and over, 138 pickups, 111 pull graders, 130 motor graders (including 120 diesels), 49 tractors including 24 diesels, 12 tractors with loader attachments, and 28 tractors with the new loader and mower attachments. The latter units the department is favoring as an all-purpose, all weather piece of machinery.

• *Rental Units Available.* In emergencies like the March blizzard, the held supervisors' expert knowledge of their areas is again employed in obtaining additional equipment—from contractors, county and municipality governments. This equipment is rented "with operator." Temporary laborers available for department work have already been hired (there are over 200 of them in the 800 field workers during the winter). This rental method has been found the most efficient in putting additional plows, trucks and graders to work during emergencies. Rental rates have been studied by a Joint Department-Contractors Association Committee. Going prices are understood throughout the state.

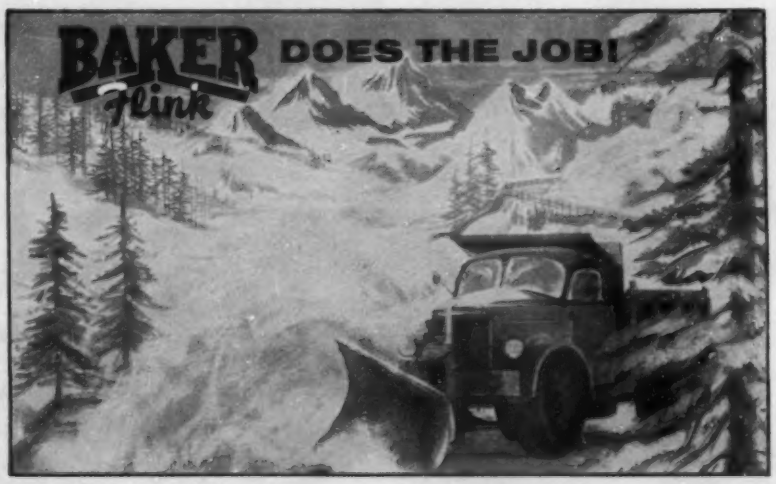
The Colorado department of highways wants to see the development of more mobile heavy equipment. A big rotary is a large investment which is used relatively little. The more readily it can be switched around, the better it will be for the department's budget and road-opening operations.

In Colorado's varied terrain, the department relies on expert, hard working maintenance men who know their areas and how to use a communication system to keep men and equipment moving to meet shifting emergencies. Although it is grounded on the fixed maintenance patrols, the department's organization points at fluid adaptability. During the Colorado winter just past, the force met the tests of state-wide storms and snow-slides and also an eastern concentration of plains blizzards and dust storms, without losing a highway user.

Connecticut Turnpike Awards Snow Plow Equipment

A contract has been awarded to the H. O. Penn Machinery Co., Inc., for plowing equipment on the Connecticut Turnpike.

The Good Roads Machinery Corporation equipment includes 87 11-ft. reversible snow plows; 5 large adjustable snow plows, with moldboard assemblies only; 17 under-frames and pneumatic lifts; and 17 pneumatic lift assemblies. Penn's bid was $117,000.



Reversible and one-way plows for 1½ to 5 ton trucks and up.

NEW! HWDS4 Spreader operates from the left side only! Saves material . . . gives better pattern (no material on shoulder), 2 speed auger for change from abrasives to straight rock salt.

MOUNTAIN PASS OR CITY BOULEVARD, THESE PLOWS HANDLE *ANY* JOB FASTER, AT LOWER COST!

Reversible or One-Way Plows with Sectional or Full Blade Trip permit fast, efficient cleaning over expansion joints, irregular pavement and other road hazards without damage to the blade. "Roll Action" moldboard keeps snow and slush moving from the center of the blade and off the roadway for high speed service. There's a Flink-Baker hydraulic power lift with both underframe or front push mounting to meet every specification.

FLINK "One-Man" Spreaders

Model SS Low cost, pull-type for ice, dust control and seal coating. Spreads all granular materials.

LMC Hopper Spreader handles salt, cinders and sand for heavy-duty ice control. PTO or gas-engine drive.

For illustrated literature on spreaders, plows, or name of nearest distributor write:

THE Flink co.

STREATOR, ILLINOIS

5515 North Vermillion Street

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Now there is a quick, easy way to reflectorize construction hazards

You asked for a fast, simple, low cost way to reflectorize construction hazards, so we put our research laboratories to work on the problem. They came up with the answer . . . and we named it "Codit" Reflective Liquid.

What is "Codit" Liquid?

Scientifically, it is a suspension of reflective elements in a solvent-dispersed vehicle. You simply apply the liquid to any rough or porous surface, and the film formed holds the reflectors in a tight grip. Thus, in only one easy brush stroke, you can give any type of hazard the safety of a bright reflective warning.

Road construction equipment and hazards flash their own warning when painted with "Codit" Reflective Liquid. Motorists travelling at night are warned of danger in time to act safely.

"Codit" Liquid adheres to any rough or porous surface . . . wood, concrete, metal, etc.

How does it Reflect?

"Codit" Liquid gives you wide angle reflectivity you can see from any angle of approach. Since it is a reflex-reflector, it catches the approaching headlight beam and directs the gathered light right back to the source. The driver then sees a warning that is 40 to 50 times brighter than white paint.

At night, the reflective warning appears as a glareless silver-white color, and by day it is a neutral gray.

Application ease and low cost

Remarkably rugged "Codit" Liquid can be easily applied by hand spray gun, tank type spray equipment, or by a simple kalsomine brush. It is also available in handy aerosol spray cans for extra convenience. You just spray it on or brush it on in a jiffy. It dries in minutes. And you've finished the whole reflectorization job.

A little goes a long way, too. One of those small 6 ounce aerosol cans will cover 6 to 8 square feet with reflective safety that keeps its brightness for a full year.

The cost is easy to take as well . . . less than 17 cents per square foot of coverage. Or for instance, you can reflectorize a 6 foot barricade for about 35¢. This is a real safety bargain.

Where to use it?

Put it on any temporary or permanent objects in or near a roadway that constitute serious hazards to traffic. "Codit" Liquid will adhere to any rough or porous surface—wood, metal, gravel, concrete and the like.

You can use it effectively on construction or repair barricades, pipe, stone, windrows, road equipment, temporary structures, railings, guard posts, trees . . . literally everything you want to use it on for fast reflectorization.

Introductory kit contains everything you need to apply "Codit" Reflective Liquid.

Special introductory offer

Right now, at a special introductory low cost, you can reflectorize road hazards the quickest, easiest way yet. For only $69.50 you can get a complete "Codit" Reflective Liquid Kit, containing everything—(from brushes to 4 pound cans to 6 ounce aerosol cans to stencils)—you need for hazard marking.

You can get this kit from your 3M Field Representative. Or you can either get more information or the kit itself by writing: 3M Company, Dept. NU-87, St. Paul 6, Minnesota.

REG. U. S. PAT. OFF.

CODIT

BRAND

REFLECTIVE LIQUID

PRODUCT OF 3M COMPANY RESEARCH

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Actual road tests prove Dodge outpulls "other two" low-priced trucks by 32%

Dodge gives you *Extra Pull* . . . cuts running time and maintenance costs

Here is definite proof that Dodge gives you a big power advantage that will pay off on your hauling jobs.

All three low-priced trucks were recently compared side by side in a grueling series of performance tests. The dynamometer test shown here is only one of them. And in each test . . . *climbing power* . . . *passing power* . . . *pulling power* . . . Dodge proved the outstanding truck of the low-priced three.

Extra power does it. From 204- to 232-hp. V-8's, Dodge *Power Giants* deliver the extra power you need to handle your hauling jobs faster, with less engine strain. Naturally, less strain means less wear, fewer repairs as you pile on the miles.

See proof for yourself. Certified results of all the comparison tests are in your Dodge dealer's showroom. Look them over and we think you'll be convinced that your next truck should be a Dodge.

DODGE and competitive trucks were tested for pulling power by towing a special dynamometer truck. Gauges measure maximum pulling force exerted. To convert this force into pounds, gauge reading is multiplied by three.

TRUCK C, pulling the same dynamometer truck as the Dodge, was unable to equal the Power Giant mark in repeated tries. Gauges show Dodge outpulled Truck C by 32%.

TRUCK F in its turn pitted all its pulling power against the Dodge, to no avail. The sealed, accurate gauges reveal clearly that Dodge offers most "pull power" of the low-priced 3.

DODGE

PowerGiants

MOST POWER OF THE LOW-PRICED 3

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"Factory approved" diesel fuel injection service... available everywhere

Prompt, efficient, and reliable service by American Bosch Authorized Fuel Injection Service Stations. Here, factory-trained experts are equipped with special tools and test equipment to give you fast, accurate repair work using genuine American Bosch replacement parts. Use your nearest American Bosch Service Station. It's a service that will save you time and money . . . and keep your diesels on the go.

Here's a complete list of Authorized American Bosch Fuel Injection Service Stations—the largest network of sales and service agencies in the industry. Tear it out and keep it for a handy reference.

ALABAMA

BIRMINGHAM, 3	Birmingham Electric Battery Co.

ARIZONA

CASA GRANDE	Diesel-Electric Service Co.
COOLIDGE	Slater Auto Supply
MESA	Perkins Diesel Service
PHOENIX	Charlie C. Jones Battery & Electric Co.
TUCSON	Auto Plane Electrical Service
YUMA	Yuma Automotive Electric

ARKANSAS

DE WITT	Graves Electric Company
N. LITTLE ROCK	Womack Bros. & Taylor

CALIFORNIA

BAKERSFIELD	Automotive Diesel & Electric Co., Inc.
EL CENTRO	Valley Automotive & Diesel Service Co.
EUREKA	Gustafson Diesel & Electric
FRESNO	Winther Bros.
HUNTINGTON PK.	Auto Electric Service
LOS ANGELES	Diesel Precision Co., Inc.
LOS ANGELES, 21	Magneto Sales & Service Co., Inc.
OAKLAND	Diesel Injection & Governor Service Inc.
OAKLAND	Pimental & Son
REDDING	Shasta Truck & Injection Service
SACRAMENTO	Diesel Pump & Injector Service
SACRAMENTO, 6	Langner & Rifkin
SALINAS	Haag Diesel & Electric
SAN BERNARDINO	Diesel Injection Service
SAN DIEGO	Electric Diesel & Equipment Co.

SAN FRANCISCO, 24	McKinley Corporation of California
SOUTH GATE	Diesel Fuel Injection Lab
STOCKTON	Connell Motor Parts
WILMINGTON	Diesel Control Corp.
COLORADO	
DENVER, 3	Central Auto Electric Company
GRAND JUNCTION	Flannery Electric Service
MONTE VISTA	Joe Riggenbach
PUEBLO	Motor Accessory and Parts
CONNECTICUT	
HARTFORD	W. J. Connell Co. of Hartford
NEW HAVEN	Clark-Son Co., Inc.
DELAWARE	
MILTON	Benson's Fuel Injection
DISTRICT OF COLUMBIA	
WASHINGTON	Diesel & Ignition Service Inc.
FLORIDA	
FT. LAUDERDALE	Broward Diesel Co., Ltd.
JACKSONVILLE	Diesel Electric Service, Inc.
JACKSONVILLE	Patten Sales Co., Inc.
MIAMI	Dade Diesel Company
MIAMI, 36	Florida Diesel Service Co.
MIAMI, 37	Nieman-Wilson, Inc.
ORLANDO	Interstate Diesel Service
TAMPA	Stuart Diesel Service
GEORGIA	
ATLANTA, 3	Auto Electric & Magneto Co.
CAIRO	Grady Motors
IDAHO	
BLACKFOOT	Auto Parts Service Co.
BOISE	Magneto & Diesel Supply Co.
LEWISTON	Osterman Diesel & Electric Co.
TWIN FALLS	Diesel Pump & Injector Service
ILLINOIS	
CHICAGO, 16	Illinois Auto Electric Co.
MENDOTA	Walzer's Diesel Service
MT. CARMEL	Deck Hill Battery Company
PEORIA	Automotive Ignition Co.
ROCK ISLAND	Lohse Automotive Service
INDIANA	
INDIANAPOLIS, 4	Gulling Auto Electric Inc.
MENTONE	Smith Brothers Garage
VALPARAISO	Diesel Service Company
IOWA	
DES MOINES	Electrical Service & Sales Co.
MARSHALLTOWN	Heuer Equipment
KANSAS	
CALDWELL	Diesel Injection Service Co.
GARDEN CITY	Bell Diesel Injection Service Co.
GREAT BEND	Bell Engine Service
GRINNELL	Grinnell Electric & Diesel Service Co.
HUTCHINSON	Reno Sales & Service
SALINA	The Motor Service Company
WICHITA, 2	E. S. Cowie Electric Co.
KENTUCKY	
LOUISVILLE	Diesel Injection Service
LOUISVILLE	Schaaf Auto Electric Co.
PADUCAH	Story Electric & Battery Co.
LOUISIANA	
BATON ROUGE	Womack Bros. Diesel Service
BOSSIER CITY	Vaughan Tractor & Auto Parts Co.
MORGAN CITY	Landry & Simoneaux
NEW ORLEANS	Gerhardt's Inc.
NEW ORLEANS, 13	John M. Walton, Inc.
MAINE	
BANGOR	American Gear Company
PORTLAND	Eastern Diesel Service Co.
PORTLAND, 5	Portland Tractor Co., Inc.
MARYLAND	
BALTIMORE	Mechanical Engineering Co.
BALTIMORE, 1	Parks and Hull Automotive Corp.
BALTIMORE	Stephen Seth & Co.
MASSACHUSETTS	
BOSTON	Boston Fuel Injection & Engine Service
BOSTON, 64	W. J. Connell Company
BOSTON, 10	Wharf Machine & Electric Co., Inc.
FAIRHAVEN	Hathaway Machinery Co., Inc.
SPRINGFIELD	C. A. Krohne & Sons
MICHIGAN	
DETROIT	Knorr-Maynard, Inc.
GRAND RAPIDS	Peninsular Engineering & Sales, Inc.
LANSING	Diesel Equipment Sales & Service
MINNESOTA	
ALBERT LEA	Smith Tire & Electric Company
HIBBING	Diesel Service Company
MANKATO	Mankato Service Company
MINNEAPOLIS	Diesel Service Co.
MISSISSIPPI	
JACKSON	Womack Brothers
MISSOURI	
KANSAS CITY, 8	Electrical & Magneto Service Co.
ST. LOUIS, 23	Diesel Fuel Injection Service Co.
ST. LOUIS, 3	Electric Parts and Service Co.
MONTANA	
BILLINGS	Original Equipment, Inc.
HAVRE	Midwest Diesel Injection Sales & Service
NEBRASKA	
HEMMINGFORD	Worley Diesel Service
McCOOK	Automotive Sales & Service
NORTH PLATTE	Reitan Service Company
OMAHA, 2	Carl A. Anderson, Inc.
NEW JERSEY	
NEWARK, 2	Tire Trading Company, Inc.
SOMERVILLE	Battery & Electric Service Co.
TRENTON, 9	Steinert Diesel Injection Service
NEW MEXICO	
ALBUQUERQUE	Central Auto Electric Company
NEW YORK	
BROOKLYN	A & D Diesel Service, Inc.
BUFFALO, 8	Hettrich Electric Service
HEMPSTEAD, L. I.	A & D Diesel Service, Inc.
PELHAM MANOR	Coretti-Gross, Inc.
ROCHESTER	Union Carburetor & Ignition Service
TROY	Ehrlich Electric Service, Inc.
UTICA	Stiefvater Electric Co., Inc.
WOODSIDE, 77	American Bosch Div. American Bosch Arma Corp.
NORTH CAROLINA	
CHARLOTTE	Diesel Injection Sales & Service
CHARLOTTE	Diesel Injection Hydraulic Service
RALEIGH	Diesel Injection Sales & Service
NORTH DAKOTA	
DICKINSON	Mann's Automotive Supply
FARGO	Midland Diesel Service & Engine Co.
GRAFTON	Grafton Auto Electric Company
MINOT	Diesel Service Company
WILLISTON	Crighton Motor Co.
OHIO	
AKRON	Standard Motor Parts
CINCINNATI	Tri-State Distributing Corp.
CLEVELAND, 8	The Cleveland Ignition Co.
COLUMBUS, 15	Columbus Ignition Co.
DAYTON, 4	Dulina Diesel Fuel Injection Equipment Sales & Service Co.
LISBON	Lisbon Diesel & Supply Co., Inc.
OKLAHOMA	
ENID	Dinsmore-Cowie Company
OKLAHOMA CITY, 2	American Electric-Ignition Co.
PONCA CITY	Auto Electric Company
TULSA	Magneto Ignition Company
OREGON	
KLAMATH FALLS	Specialized Service Co.
MEDFORD	Haupert Diesel Service
PENDLETON	Eds Magneto & Diesel Co.
PORTLAND, 14	Automotive Products, Inc.
ROSEBURG	Diesel Injection Service
PENNSYLVANIA	
CHAMBERSBURG	Aden L. Hawbaker
HARRISBURG	Penn Diesel Service Co.
HAZLETON	Penn Diesel Service Co.
MT. CARMEL	Gengler's Diesel Service & Sales
PHILADELPHIA	North American Diesel Injection Co.
PHILADELPHIA	Sullivan Brothers
PHILLIPSBURG	Keystone Diesel Injection Service
PITTSBURGH, 6	Automotive Ignition Co., Inc.
SOUTH CAROLINA	
CHARLESTON	Diesel Fuel Injection Service
COLUMBIA	Boney Diesel Works Co., Inc.
SOUTH DAKOTA	
LEMMON	Josund Auto Electric
RAPID CITY	Hoseth Auto Electric
SIOUX FALLS	Dakota Diesel Service Co.
TENNESSEE	
KNOXVILLE, 15	Diesel-Magneto Service Co.
MEMPHIS, 4	Automotive Elec. Service Co.
NASHVILLE	Precision Parts Corp.
TEXAS	
BEAUMONT	Diesel Engine & Pump Co.
CORPUS CHRISTI	Magneto & Diesel Injector Service
DALLAS, 1	Beard & Stone Electric Co., Inc.
EL PASO	Reynolds Batt. & Mag. Co.
HOUSTON, 1	Beard & Stone Electric Co., Inc.
HOUSTON	Diesel Pump & Injector Service
HOUSTON	Magneto & Diesel Injector Service
ODESSA	Electric Service & Supply
PAMPA	Radcliff Bros. Electric Co.
SAN ANTONIO	S. X. Callahan
SAN ANTONIO	Womack Bros.
UTAH	
SALT LAKE CITY	Diesel Electric Service & Supply Co.
SALT LAKE CITY	Midwest Service & Supply Co.
VIRGINIA	
HARRISONBURG	Valley Distributors, Inc.
LYNCHBURG	M. & R. Diesel Service
NORFOLK	Diesel Injection Sales and Service
RICHMOND	C. H. Woodward Electric Co., Inc.
SALEM	Diesel Injection Sales & Service
WASHINGTON	
SEATTLE	Seattle Injector & Electric Co.
SPOKANE	Gas & Diesel Truck Shop
SPOKANE	Spokane Diesel & Electric Co.
SPOKANE	Sunset Electric Co.
WALLA WALLA	Walla Walla Motor Supply, Inc.
YAKIMA	Diesel & Electric Service Co.
WEST VIRGINIA	
CHARLESTON	Mountain Service
WHEELING	Diesel Injection Sales & Service Co.
WISCONSIN	
MILWAUKEE	Fuel Injection & Electric Co.
WYOMING	
CASPER	Cotter Battery & Electric Company
MILLS	Diesel Service Company
ALASKA	
ANCHORAGE	Reeve Alaska Airmotive
JUNEAU	Van's Diesel Service
CANADA	
CALGARY	Hutton's, Ltd.
EDMONTON	Diesel Service (1954), Ltd.
EDMONTON	Smith Battery & Auto Electric
FREDERICTON	Stairs Bros.
HALIFAX	Stairs Bros. Reg'd.
LONDON	Universal Ignition & Battery, Ltd.
MONTREAL	International Electric Co., Ltd.
MONTREAL	Northam Equipment, Ltd.
OTTAWA	Welch & Johnston, Ltd.
PETERBOROUGH	A. C. Curtis, Ltd.
QUEBEC	Quebec Gas & Diesel Engines, Ltd.
REGINA	Electric Motor Service
ST. JOHN'S (Newfoundland)	A. H. Murray & Co., Ltd.
SASKATOON	Lambert Electric, Ltd.
SUDBURY	Yuill & Craig
TORONTO	A. Cross & Co., Ltd.
TORONTO	Auto Electric Service Co., Ltd.
TORONTO	Westway Auto Electric, Ltd.
VANCOUVER	Fred Holmes Fuel Injection Sales & Service, Ltd.
VANCOUVER	Jeffree & Jeffree, Ltd.
VANCOUVER	Vivian Diesels & Munitions, Ltd.
VERNON	J. S. Galbraith & Sons
WINNIPEG	Brown & Murray, Ltd.
HAWAII	
HONOLULU	Honolulu Iron Works Company
HONOLULU	Kawaiahao, Ltd.
HONOLULU	Todoki Machine & Marine Works
PUERTO RICO	
SAN JUAN	General Equipment Corp.

AMERICAN BOSCH

DIVISION

AMERICAN BOSCH ARMA

CORPORATION

SPRINGFIELD 7, MASS.

New Products

Reader Service Numbers Are on Enclosed Postage-Paid Postal Card Opposite Page 103

240-ton Batching Plant

Noble Batch Plant

A new 240-ton batching plant, announced by the Noble Co., 1860 Seventh St., Oakland 20, Calif., batches cement and aggregates at the same time. Through an exclusive system of multiple scales, the Noble batching cycle is stated to be completed faster. It is stated the plant can deliver 7 yd. batches every 150 seconds. Smaller batches down to 2 yd. are delivered in correspondingly shorter periods. Automatic or semi-automatic operation. Factory-assembled center section complete with all batching components and controls is now housed in a rigid "A" frame providing easy accessibility for operator.

Distance between supporting columns has been increased to allow greater clearance for trucks. 240-ton aggregate bins are available with from 2 to 6 compartments. Long wearing bin gates are replaceable. Plant is designed to accommodate 2 tilting type mixers. Cement storage is from 1,200 cu. ft. to 2,500 cu. ft.

For more details circle 101 on Enclosed Return Postal Card.

Batch Tripping Mechanism

A new hydraulic batch tripping mechanism, said to afford split-second batching and especially designed for use on high production paving operations, has been announced by Hercules Steel Products Co., Galion, Ohio. Controlled by the driver from within the truck cab, the new batch tripping system is reputed to permit batching trucks to handle fastest paving schedules easily. With the new time-saving system, the truck is backed into the paver skip with the body already raised. Then the driver presses the tripper dash control and the selected batch is instantly released. Partitions are re-locked by the driver while returning to the batching plant.

Hercules Batch Tripper

For more details circle 102 on Enclosed Return Postal Card.

High Speed Truck Mixer

Rex Adjusta-Wate Mixer

There is single-lever operation with a new design instrument panel having all controls clustered close before the operator. This new arrangement is stated to increase efficiency of the operator by saving waste motions and awkward movements.

The charging-mixing-discharge cycle of these new models has new features. Hopper opening is larger and steeper sloped. Drum rpm has been greatly increased. New fast shrink blade located in the drum head further speeds up charging by keeping mixed material at the front of the drum.

High-speed cycle, along with achievements in design and operational simplicity, are claimed for the new Rex Adjusta-Wate Moto-Mixers, now in volume production by Chain Belt Co., Milwaukee 1, Wis.

For more details circle 103 on Enclosed Return Postal Card.

Refuse Collecting Unit

A completely new line of Load-Packer refuse collection units, announced by Gar Wood Industries, Inc., Wayne, Mich., is a batch type unit, claimed to feature fast cycling and fast loading and compaction. The new unit's loading hopper is 75 in. wide. The hopper has a 1½ cu. yd. capacity, and is mounted 4 in. below the truck chassis.

The new Load-Packer also is stated to feature exceptionally fast cycling of each "batch" of refuse into the unit's body. There is no waiting for the packing plate to move into position. It is stated that 4 seconds from the time the cycle begins, the hopper is ready to be loaded again.

For more details circle 104 on Enclosed Return Postal Card.

V-8 Model Power Unit

A V-8 model power unit has been announced by the Construction Equipment division of International Harvester Co., Melrose Park, Ill. The new 8-cyl. unit model UV-549 can be operated on gasoline, natural gas or LPG. It is presently available for use on deep-well irrigation jobs. The unit has a 166 hp rating at 2600 rpm, using gasoline and LPG. The unit has a compression ratio of 6.9 to 1, using gasoline, and 8.5 to 1 on LPG and natural gas. Displacement is 549 cu. in., with bore and stroke of $4\frac{1}{2}$ x $4\frac{5}{16}$ in.

For more details circle 105 on Enclosed Return Postal Card.

54-in. Sand Processing Screws

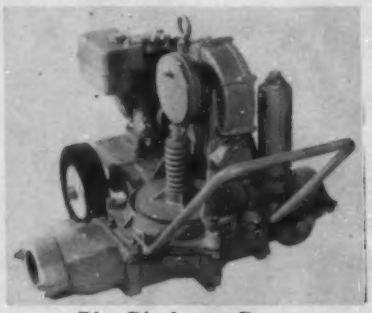
To meet demands for fine material washer-classifier-dehydrators of larger capacity, Eagle Iron Works, 129 Holcomb Ave., Des Moines, Iowa, has introduced a new unit in either single or double screw type. Screw diameter is 54 in. and tub length 34 ft. Normal screw speed is 14 rpm. Capacity of the single screw is 250 tons per hour, that of the double screw, 500 tons. Construction in general is the same as for smaller size units, though shafts, bearings and drives are heavier. Featured is an improved feed box which will become standard on all Eagle fine material screws. It is designed to reduce turbulence to a minimum in the settling pool area.

Eagle Washer-Classifier-Dehydrator

For more details circle 106 on Enclosed Return Postal Card.

Light Diaphragm Pump

A new line of light-weight diaphragm pumps, announced by Rice Pump and Machine Co., Belgium, Wisc., is stated to be completely new in diaphragm pump design. Speed reduction from engine to pump is accomplished in one step by means of a worm gear drive. This drive eliminates intermediate speed reducers on engines and motors. This is stated to make for lighter weight, compactness and more efficient transmission of power. This new line of pumps is available with suction accumulators and swing type valves or with ball check valves. Particular attention has been devoted to improved valve design and control of interior velocities to prevent clogging under adverse conditions.



Rice Diaphragm Pump

For more details circle 107 on Enclosed Return Postal Card.

Improved Pipe Driver

Delaware Tool Steel Corp. Wilmington, Del., offers an improved pipe driver in its present line of pipe driving accessory tools. The design of the new tool has been retained but the tool incorporates features which provide for more rugged service and longer life.

The pipe driving tool is used with standard pneumatic paving breaker hammers for driving new pipe or replacing old pipe under roadways, sidewalks or lawns. Pipe drivers, adapters, connecting pins and driving points are available individually, or as a complete set in a kit.

For more details circle 108 on Enclosed Return Postal Card.

Improved Wagon Drill

A new improved wagon drill, announced by Schramm, Inc., 900 East Virginia Avenue, West Chester, Pa., features long feed travel, a new down-pressure motor and line oiler, and a full range of feed pressure.

A standard Schramm 4-in. drifter is employed, with 10-ft. feed travel for

Schramm Wagon Drill

8-ft. steel changes. Other improvements include a double cylinder, 7-blade air motor. This high-torque motor runs evenly with 14 impulses per revolution. Supply air can be throttled for an infinite number of feed pressures. Feed chain take-up is said to be new and convenient. A new 2-gal. capacity line oiler is arranged so that a motor for the U-bar, or any other equipment, can be lubricated. At the lower end of the air shell is a Schramm centralizer, which prevents the drill from "walking" when a hole is started.

For more details circle 109 on Enclosed Return Postal Card.

Front Engine Drive on Mixer

Rocket Truck Mixer

A new Rocket truck mixer equipped with front-engine drive has been introduced by Concrete Transport Mixer Company, 4985 Fyler Avenue, St. Louis, 9, Mo.

The illustration shows a recent installation of a C-70 (7-yd.) Rocket on an RF-190 International truck. The V-belt drive and clutch housing are between the bumper and the grill. This assembly is connected to the mixer transmission by a multiple drive shaft and universal joint group.

For more details circle 110 on Enclosed Return Postal Card.

Level-Transit with Lock Lever

A new level-transit has been introduced by the David White Instrument Co., 2051 N. 19th St., Milwaukee 5, Wisc. Although originally intended for small job requirements, the level-transit can serve as an auxiliary instrument on large-scale projects. Main feature of the device is the level lock lever consisting of a solid lock bar. This bar moves across the right side of the standard and engages the solid prong of the telescope clamp assembly and locks into position at the other standard. The lever can easily be released for tilting the telescope. The user is able to quickly and accurately line up the instrument for leveling.

White Level-Transit

For more details circle 111 on Enclosed Return Postal Card.

Electric Flashing Warning Light

Escolite, a new electric flashing warning light, has been placed on the market by Nafisco, Inc., 7131 Merchandise Mart, Chicago 54, Ill. The light is designed for hard use under all weather conditions. The power unit is of special design. Each battery gives 30 day life. The mechanism is hermetically sealed, protecting it from dirt and water. The unit has a special theft-proof locking device. The light is stated to be brighter, easier to see, and flashes stay on longer.

Nafisco Warning Light

For more details circle 112 on Enclosed Return Postal Card.

Detergent for Steam Cleaning

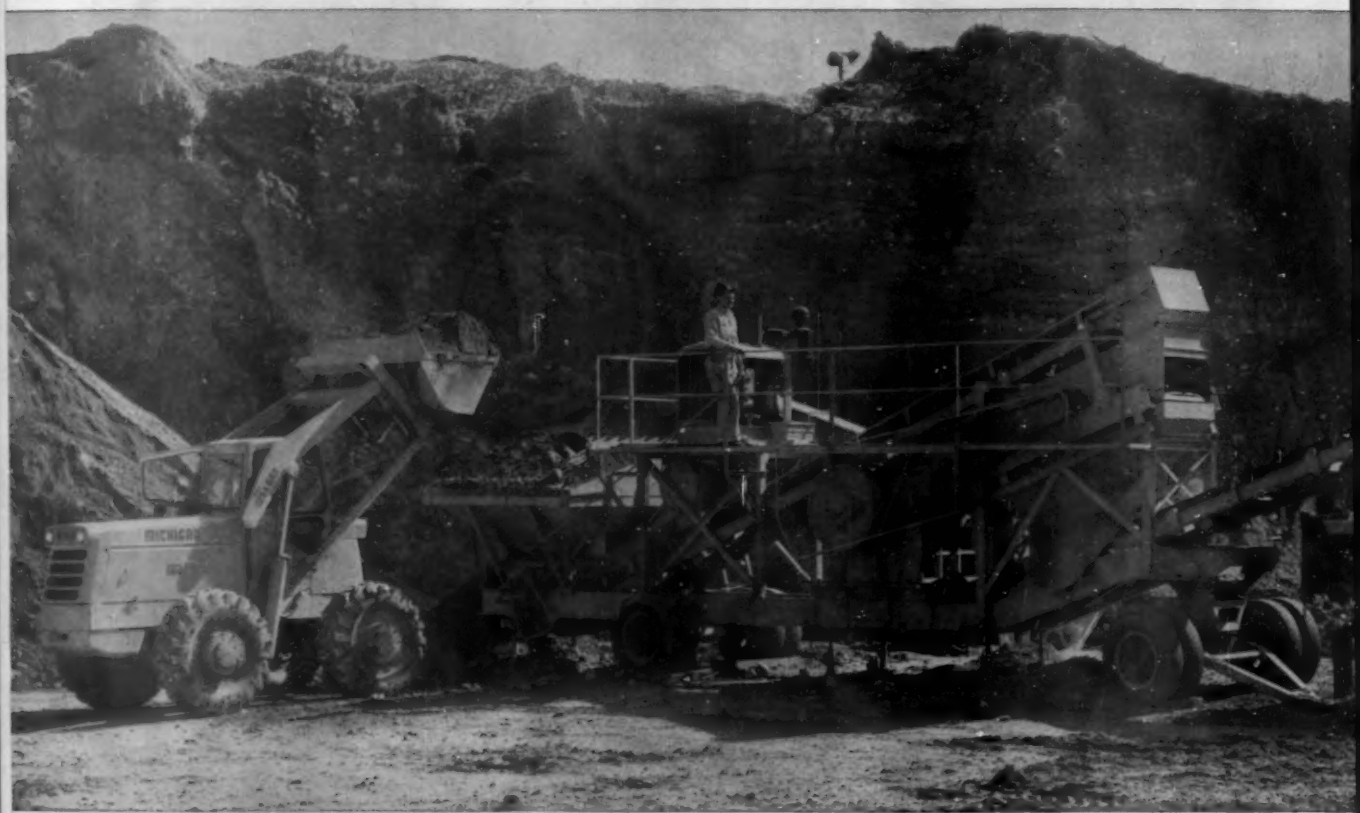
Oakite LSD, a new liquid detergent designed for use in solution lifting steam guns and self generating steam cleaning equipment, has been introduced by Oakite Products, Inc., 157 Rector Street, New York 6, N.Y.

Developed to simplify the preparation of steam cleaning solution and to reduce the clogging coils in self generating equipment, it will handle a wide variety of steam cleaning operations ranging from light to medium-heavy duty. Oakite LSD is said to provide

(Continued on page 137)

SOME UNUSUAL WAYS

Michigan Tractor Shovels are saving time and money for road builders around the country



Feeds portable crusher—Making good use of its high lift, Michigan Model 125A digs and dumps raw bank gravel into hopper of 100-ton-per-hour base material plant. Photo comes from Southern Hills Inc. pit near Dayton, Ohio, where the 2 yd Michigan did the work of a more expensive, less versatile, far less mobile excavator-crane.

Grades shoulders—Special side bucket attached to Michigan 175A grades 3 ft shoulder next to newly-poured slab. Unique rig does jobs not possible with grader drop-blade . . . including filling holes, distributing gravel, removing spoil. Attachment, designed by Villa Contracting Co, is helping widen 27 mi of N.J. Garden State Parkway.

Pours concrete—Hauling concrete in Michigan Tractor Shovel bucket, Slattery Rock Corp. solves problem of laying 6 lanes of New York's Deegan Expressway under low viaduct. Two of these maneuverable "buggies" needed only 4 hours, 200 to 250 trips to pour 800 ft of each 12 ft lane.

Carries pipe—One of Peter Kiewit's Michigans serves as all-around handyman on company's Indiana Turnpike contract. This 102 hp model lifts up to 11,000 lbs, carries, 5,500 lbs at 4 mph. Note excellent all-around visibility given operator.

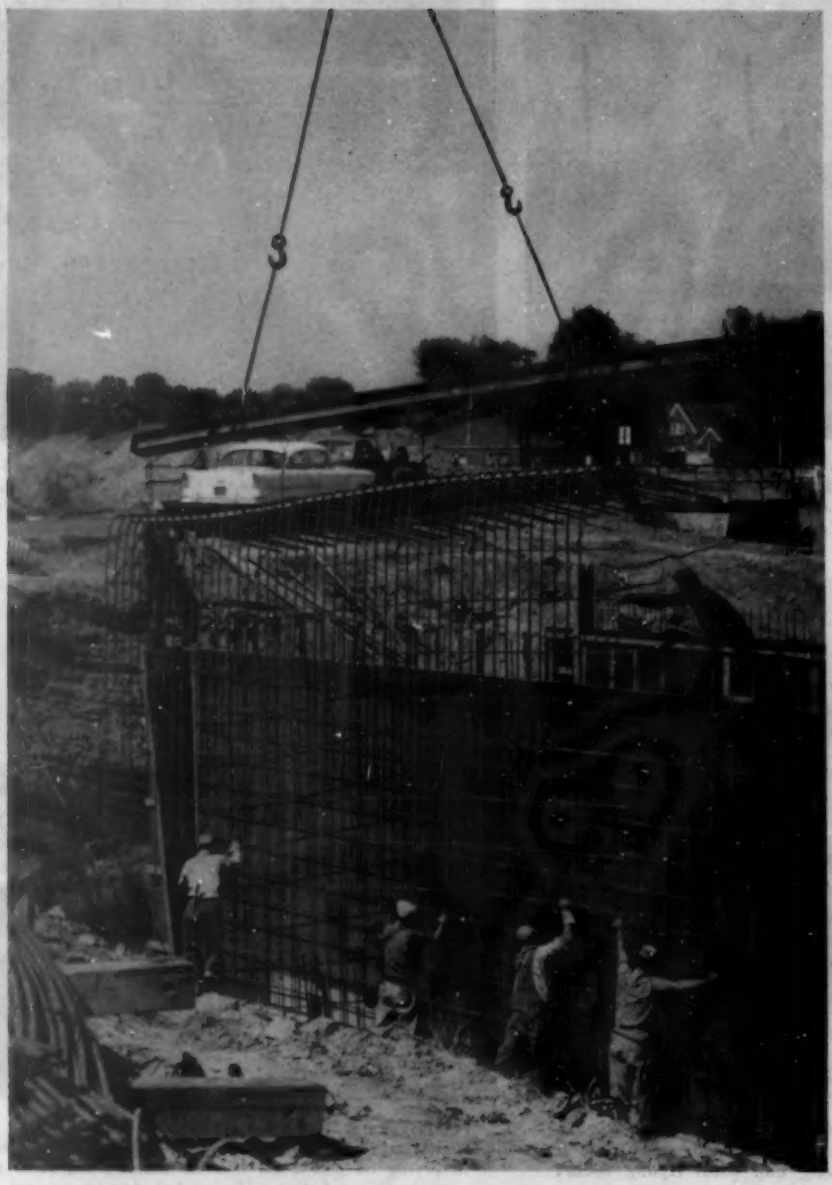
Breaks, loads asphalt—Before resurfacing street in Worcester, Mass., Contractor Charles. Chaffee uses 1¼ yd Michigan to strip old asphalt. No "ramming" is required—powerful breakout quickly shatters paving.

Cleans pavement—Highway must stay open said Nashville officials, so Wright & Lopez do cleanup with small, agile 16 cu ft Michigan. Only 4'2" wide, 10'8" long, unit works rapidly, doesn't block traffic, doesn't damage newly-set pavement.

Removes sewer cover—When other big loaders failed, Kirby-Erwood's 133 hp Michigan succeeded in prying off this 2-ton concrete cover. Assignment was part of cleanup before widening Los Angeles freeway.

Digs shot rock—Time studies proved to Cummings-Roberts, Darby, Montana, that this 2¾ yard Michigan would outproduce crawler-loaders in both pit-run and shot-rock, despite narrow benches, 7000' altitude.

Breaks, loads concrete—On New York City street repaving job, Triboro Asphalt Co. breaks and loads 4 to 6-inch concrete slab with this 133 hp Michigan Model 175A.



LACLEDE HIGHWAY STEELS

speed underpass construction on new U.S. 40 expressway

Laclede's strong, yet light-weight reinforcing steels speed road construction work because they're easy to handle and place.

Missouri State Highway Department
Fruin-Colnon Contracting Company
St. Louis, Missouri

other Laclede highway steels are . . .

welded dowel spacers • multi-rib round reinforcing bars

center joints • recess joints • tie bars • accessories

LACLEDE

LACLEDE STEEL COMPANY

SAINT LOUIS, MISSOURI ◆ Producers of Steel for Industry and Construction

. . . for more details circle 311 on enclosed return postal card

New Products

(Continued from page 133)

effective soil removal at concentrations of 1 to 2 oz. to each gal. of water as delivered by the gun.

For more details Circle 113 on Enclosed Return Postal Card.

Light 6 HP Chain Saws

Homelite Chain Saws

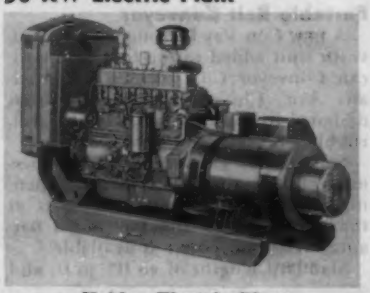
Two new chain saws, model 6-22 and EZ-6 have been announced by Homelite, Port Chester, N. Y. Called the Homelite "Power Twins", both chain saws have a 6-hp engine. The EZ-6 is a direct-drive, 19-lb. unit; the 6-22 is a gear-drive, 22-lb. unit.

According to the manufacturer the EZ-6 will cut through 8-in. oak in four seconds, 18-in. pine in twelve seconds and bring down trees up to 5 ft. in diameter.

The new gear-drive 6-22 is stated to have the lugging power to bring down trees up to 7-ft. in diameter and to cut through 20-in. trees in eighteen seconds.

For more details circle 114 on Enclosed Return Postal Card.

50 KW Electric Plant



Kohler Electric Plant

A new model 50 KW electric plant is now being offered by Kohler Co., Kohler, Wisc. Features include a 6-cyl. liquid cooled engine developing 115 hp at 1800 rpm, 60-cycle rotating field generator with automatic voltage regulation. Available in 120/208, 115/230 and 230 volt models.

For more details circle 115 on Enclosed Return Postal Card.

Detachable Gooseneck Trailer

A new detachable gooseneck trailer has been announced by Rogers Bros., Corp., Albion, Pa. The gooseneck

Rogers Detachable Gooseneck Trailer

mounts a hydraulic ram with a foot through which power is exerted to raise and lower the frame for detachment of the gooseneck and for the performance of other unusual operations. Power is supplied by a pump operated by a power take-off or in trailers of smaller capacity by an electric motor powered by the truck battery.

The operator faces the trailer as he handles all movements by means of a control lever on the gooseneck. In add tion to being capable of fast detachment and reattachment, the foot in contact with the ground makes possible new desirable operations.

For more details circle 116 on Enclosed Return Postal Card.

Fork Truck for Off-Road Work

A pnuematic tired model of 15,000 lb. capacity has been added to the line of fork trucks for off-the-road handling at Industrial Truck division of Clark Equipment Co., Battle Creek, Mich.

Clark Fork Truck

With four-wheel drive, power steering, power shifting and an oscillating rear axle, the Ranger line is designed for operation through heavy mud and over the rough terrain usually found at lumber mills and construction sites. On the Ranger 150, four-wheel drive or two-wheel drive is obtained by manipulation of a selector lever.

The power train combines a torque converter with 3-to-1 multiplication with a four-speed power shift transmission. A 95 net BHP gas engine or 102 net BHP diesel engine are available. Specifications and dimensions of the Ranger 150 include a top speed of 25 mph in both forward and reverse, underclearance of 14 in., turning radius of 312 in., wheelbase of 108 in., length, less forks, of 210 in., width of 102 in., and empty weight of 26,740 lb.

For more details circle 117 on Enclosed Return Postal Card.

Portable Diesel Electric Sets

Three new portable diesel electric sets have been announced by Caterpillar Tractor Co., Peoria, Ill. The new units are the Caterpillar D311, D315 (series G), and D318 (series G) diesel electric sets, each equipped with the new, compact Caterpillar generator.

The D311 electric set develops 30 kw. of 60-cycle, 3-phase current, while the D-315 (series G) electric set is rated at 40 kw., and the D318 (series G) electric set at 60 kw.

These units are available either skid-mounted or with running gear, and the output of their self-regulated, constant-voltage generators furnishes a choice of 120, 240, 120/208 or 480 volt current at 1800 rpm. Standard equipment on the sets includes 24-volt, 18-ampere charging generators and 24-volt, 170 ampere-hour battery sets.

For more details circle 118 on Enclosed Return Postal Card.

Truck-Mounted Water Sprinkler

Complete information on two types of water sprinklers is available from Littleford Bros., Inc., 457 E. Pearl Street, Cincinnati 2, Ohio. Truck and trailer-mounted units with gravity feed are equipped with spray bars 8 ft. in length and 2 in. in diameter. Pressure type spray bars are available if desired. Gravity feed units range in size from 800 to 1500 gal. A pressure type, truck-mounted water sprinkler can be equipped with a spray bar 8 ft. to 24 ft. in length. Pump size is 2 or 3 in. in diameter depending on the length of spray bar used. Sizes for the pressure type, truck-mounted sprinkler range from 800 to 1500 gal.

For more details circle 119 on Enclosed Return Postal Card.

Littleford Truck-Mounted Sprinkler

Badger Hydro-Scopic Hopto

Hydraulic Backhoe

A new model in its line of completely hydraulic backhoes and shovels has been announced by the Badger Machine Co., Winona, Minn. The new machine is called the 360 Hydro-Scopic Hopto.

Several sizes of backhoe buckets for trenching and excavating, and various tools for grading, sloping, ditch cleaning, ditch forming, concrete ripping and concrete removal, are available. All of the buckets and tools are equipped with the exclusive, patent pending, "snap-on" adapter. The "snap-on" bucket and tool adapter permits the operator to change the bucket or tool in a matter of seconds without leaving the operator's cab.

The triple-section, all-hydraulic telescoping boom gives a digging depth of 20 ft. and a loading height of 19 ft. Boom retracts so that it may be carried on a carrier to meet all legal height and over-hang regulations.

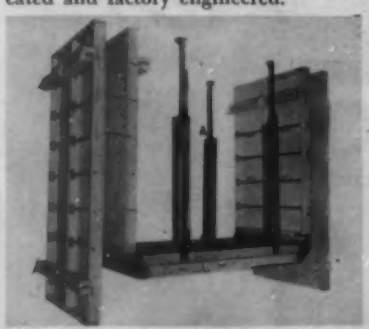
The 360 Hydro-Scopic Hopto is also equipped with a bucket tilt mechanism for digging vertical walls and square corners.

For more details circle 120 on Enclosed Return Postal Card.

Steel Culvert Form

A new steel form, claimed to simplify the construction of culverts, has been introduced by Symons Clamp & Mfg. Co., 4249 W. Diversey Ave., Chicago 39, Ill.

The culvert form is designed to connect Symons standard wall panels and slab panels so that a culvert can be poured monolithically. No built-up forms or other special equipment is necessary, since all units are prefabricated and factory engineered.



Symons Form

Symons' culvert form is a 9 x 9-in. steel section which provides for a 3-in. face on the roof slab and on the wall with a 45-degree angle surface 8½-in. wide between wall and roof. It comes in lengths of 4, 6, and 8 ft. and is produced for use with both metal frame and wood frame forms. Special size forms are available on order.

For more details circle 121 on Enclosed Return Postal Card.

Self-Propelled Rotary Drill

Pneumatractor Rotadrill

A rotary air drill mounted on a self-propelled air compressor has been developed by Schramm, Inc., 900 E. Virginia Ave., West Chester, Pa. Known as the Pneumatractor Rotadrill, this compact unit is stated to feature low original cost, convenient hole-to-hole maneuverability, and economical operation.

Rotary air drilling is accomplished through a reversible hydraulic motor-driven head, mounted on a carriage that rides tracks on the mast. This hydraulic drive eliminates the rotary table and Kelly bar. Hydraulic drive is smooth and undamaged by bit sticking. Holes can be drilled to 500 ft. with 2-⅞ in. OD flush drill pipe.

For more details circle 122 on Enclosed Return Postal Card.

Electronic Speedometer

A new Ametron electronic speedometer, announced by Streeter-Amet Co., Grayslake, Ill., is a portable, tube operated measuring instrument that is designed to determine and register the speed of vehicles.

The special new feature claimed for this speedometer is the speed and accuracy of the checking operation. It can be handled by one man checking in both directions. As the distance between the two road tubes is only 11 ft. it enables the placing of the tubes in strategic spots to clock cars before the driver is aware of the check point. It can be operated from a car by simply plugging into the cigar lighter.

For more details circle 123 on Enclosed Return Postal Card.

Bulldozer Attachment

Eartheo Dozer

A new heavy-duty dozer attached to the main frame of the tractor, has been announced by the Earth Equipment Corp., 2036 Sacramento St., Los Angeles, Calif.

The new mode of attachment is stated to enable the dozer blade to remain in the same plane with the rear axle of the tractor regardless of the terrain the front wheels pass over. Constructed of heavy material it has a 450-lb. shipping weight; the standard moldboard length is 72 in. The cutting blade is of ½-in. by 6-in. grader steel and is replaceable.

For more details circle 124 on Enclosed Return Postal Card.

Portable Belt Conveyor

A new Con-Vay-It troughed belt conveyor unit added to the line of American Conveyor Co., 2133-37 S. Christiana Ave., Chicago 23, Ill., has been designed to handle earth, sand, gravel, rubble, etc.

Small boom cross-sectional area permits passage through restricted openings. Standard power mounting is at the conveyor foot and for weight balance, head end power is available.

Standard lengths of 20 ft., 30 ft. and

Con-Vay-It "T" Belt Conveyor

(Continued on page 143)

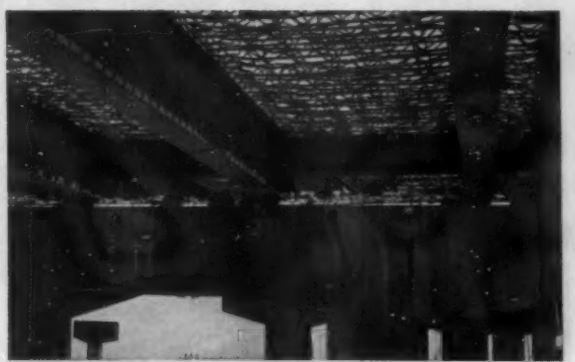
HAYMAKER: Big 750-lb. hammer, powered by Jaeger "600" rotary, delivers 22,000 ft. lb. wallop; breaks old concrete on San Francisco-Oakland Bay bridge toll plaza. Slab was 6" thick, with double curtain steel reinforcement.

1-2 and out with Jaeger air

On Oakland Bay bridge improvement job, this Jaeger "600"-powered pavement breaker delivered a neat knock-out punch. Concrete was jarred completely clear of double curtain reinforcing steel, eliminating usual nasty clean-up job. Hefty 22,000 lb. wallops (45 to 60 a minute) did it.

Keeping full air pressure behind the 750 lb. hammer was easy for the Jaeger 600 cfm rotary. Its Model 6-71 GM diesel engine never ran faster than a fuel-saving, wear-saving 1650 rpm. Other "600" compressors, with the very same engine, need 100 to 150 rpm faster full load speed.

You get this same slow-speed, efficient performance, saving fuel, fpm of engine piston travel and thousands of compressor revolutions per hour, in Jaeger 125, 250 and 365 cfm compressors, too. For example, the Jaeger "365", with 50 cfm more capacity than "old standard" 315 cfm units, operates at 1700 rpm instead of 1800. See your Jaeger distributor for full data or send for Catalog JCR-5.



KNOCKOUT: Double curtain reinforcing steel is completely cleared of concrete by the breaker—a clean job that saved time and cost. With Jaeger air power, special heavy duty tool broke up as much as 700 cu. yds. of reinforced concrete a day.

THE JAEGER MACHINE COMPANY

223 Dublin Avenue, Columbus 16, Ohio

PUMPS • CONCRETE MIXERS • SPREADERS • FINISHERS • TRUCK MIXERS

. . . for more details circle 308 on enclosed return postal card

For profitable performance

go GarWood

Gar Wood-Buckeye 308 . . . the job-proved standard on grueling cross-country work. Split-shaft excavator drive provides equal power to each drive pinion . . . ends misalignment wear. Hydraulic wheel hoist permits quick adjustment for depth and grade. Simple, grouped controls offer ease of operation. Hydraulic conveyor drive is instantly controlled . . . no complicated shifting . . . never any need to leave the operator's seat!

New Gar Wood ripper is balanced to the power and weight of Euclid TC-12 tractors. Revolutionary swivel-type ripper teeth increase tractor maneuverability . . . save time on turns because they don't have to be lifted out of the ground. Easily and quickly controlled by famed Gar Wood hydraulic system. King-pin construction makes it easy to change pitch of each tooth, adjust for maximum penetration regardless of digging conditions.

Performance, the kind you can depend on regardless of job conditions, demands advanced design as well as quality construction of equipment. You get both when you go Gar Wood!

In excavators, for example, Gar Wood has developed performance features that insure maximum production. Independent chain crowd puts full engine power into every bite on shovel applications. Independent travel lets operator hoist or swing while moving. Direct gear drive and direct manual controls make for fast, accurate control on precision jobs. And just as important, Gar Wood's job-proved heavy-duty construction results in long unit-life with minimum maintenance!

If your work demands performance you can count on, take a *good* look at the complete line of Gar Wood truck equipment and construction machinery. Call your Gar Wood dealer, or write to: Customer Service Dept., Gar Wood Industries, Inc., Wayne, Michigan.

Gar Wood-St. Paul hoists and dump bodies . . . real performance-twins! Integral construction of lift-arms with a torque tube prevents one-sided lifting strains. This means fast, safe dumping . . . even on steep grades! Extra-rugged body construction at critical stress points eliminates spreading, warping or sagging! There's a full line of Gar Wood-St. Paul hoists and dump bodies in all capacities . . . one for your job!

GAR WOOD

PLANTS IN WAYNE AND

when the going gets rough...

Gar Wood 75's **stand up longer . . . perform better! Heavy-duty conical-hook double rollers eliminate pin strain and rocking under load. Massive crawler base is built to stand up under the heaviest shocks and strains. Large-capacity drums and sheaves make for perfect spooling, longer cable life! Hydraulic coupling, capable of absorbing shock loads, is optional equipment.**

INDUSTRIES, INC. Wayne, Michigan

YPSILANTI, MICH.; FINDLAY, OHIO; MATTOON, Ill.; RICHMOND, CALIF.

. . . for more details circle 288 on enclosed return postal card

Stones and rocks made digging tough.

Compact rugged Cleveland's smooth crawler mounting real public relations asset in 70,000′ tough digging

The light weight, hi-tensile alloy steel construction and smooth crawler mounting of this Cleveland 92 "Baby Digger" enabled Rich & Co., Bradford, Pa. to cut 70,000 feet of trench in stony tough digging without causing damage to the sidewalks and fine old lawns in and around Groton, N. Y. The compact design and quick-and-easy maneuverability of the 92 were other big helps in digging these 4-inch pipe gas mains and laterals for New York State Electric and Gas Co., Ithaca, N. Y. The rugged 92 weighs only 10,000 pounds, is only 4½ feet wide over its crawlers, yet digs 10 to 20 inch trench widths and down to full 5 feet deep—in *all* soils.

The 10,000 lb. 92 treads lightly on lawn and sidewalks.

Compact 92 can put trench within 20" of side obstructions.

Good Everywhere

THE CLEVELAND TRENCHER COMPANY

20100 St. Clair Avenue • Cleveland 17, Ohio

. . . for more details circle 266 on enclosed return postal card

New Products

(Continued from page 138)

40 ft. with electric motor or gasoline engine power and High-Boy elevating frame provide flexibility of application.

For more details circle 125 on Enclosed Return Postal Card.

Earth Boring Machine

A new suspended-type, completely hydraulic earth boring machine, announced by Highway Trailer Co., Edgerton, Wisc., will dig holes 11 to 22 in. in diameter, up to 7 ft. deep, and at any angle up to 90 degrees. Designed as the model "B" Digger, it can be front or rear mounted on any type of line construction body, with any type of hydraulic derrick. When not in active use, the new unit is "self-storing" on the roof of the truck. It is stated that the new earth boring machine will dig in every type of soil including frost and hard pan. A drive chain crowd assembly assures rapid and smooth downward digging action, it is said.

Earth Borer

For more details circle 126 on Enclosed Return Postal Card.

5 Cu. Yd. Capacity Scraper

A new scraper has been announced by Gurries Manufacturing Co., 1720 S. First St., San Jose, Calif. The new Gurries GS-2 AG scraper has a 3.60 cu. yd. struck capacity and a 5.0 cu. yd. heaped capacity. A hydraulic cylinder raises and lowers the bowl. A shallow angle blade is stated to cut draft and permit a heaped load with minimum power. Load is quickly and completely dumped by hydraulic power which raises apron and dumps load. Load can be spread in thin controlled layers or dumped in one spot. The GS-2 takes a 7 in. cut, and rear wheels track inside cut.

Gurries Scraper

For more details circle 127 on Enclosed Return Postal Card.

Weed Sprayer Attachment

Worthington Weed Sprayer

A new weed sprayer attachment for its model "F" unit has been announced by Worthington Mower Co., Stroudsburg, Pa.

The sprayer is a self contained unit consisting of a tank, gasoline engine, and adjustable spray boom that can be folded out of the way. It can be fitted into the back of a Worthington model "F" tractor and used in conjunction with gang mowers. The entire unit can be installed by the user in a matter of minutes. Once the engine of the rig is started, the spray may be controlled by the operator without leaving the seat of the tractor.

For more details circle 128 on Enclosed Return Postal Card.

Air Filter for Heavy Equipment

A specially designed OTR (Off-the-Road) filter has been made available to the construction industry by the Dollinger Corporation, 11 Centre Park, Rochester 3, N. Y. This is an intake air filter employed as a pre-cleaner for use in conjunction with oil bath filters on diesel and gasoline engines of heavy mobile or stationary equipment.

OTR Air Filter

The new filter is claimed to reduce substantially maintenance cost and insures longer life for engines of heavy equipment such as scrapers, bulldozers and trucks.

The pre-cleaner uses a dry type filter medium, Feltex 40, which is 99.7% efficient in stopping dirt that would pass through conventional oil bath cleaners to the rings, pistons and cylinder walls.

Installed as a pre-cleaner in a matter of minutes, the OTR is easy to maintain by merely blowing off the filter daily with 70 lb. compressed air.

For more details circle 129 on Enclosed Return Postal Card.

Deere Power Steering Assembly

Deere Power Steering Installation

Power steering is the latest advancement in the line of industrial tractors of John Deere Industrial division, Moline, Ill.

The new power steering assembly is available for factory or field installation on the "420" utility and "420" special utility industrial tractors. It includes a hydraulic cylinder located between the tractor front-end support and a special heavy-duty steering arm.

The hydraulic cylinder, which has an 8-in. stroke, receives oil from the regular "Touch-o-matic" hydraulic system through a special hydraulic flow divider and control valve. The hydraulic flow divider, control valve, and oil lines are located under the tractor hood where they do not affect the clean appearance of the tractor.

The system is actuated by applying approximately 3 lb. of pressure to the steering wheel. Tractor can be steered manually if it is desired to move it without starting tractor engine.

For more details circle 130 on Enclosed Return Postal Card.

New Features on Dump Body

Three new "Speedlift" dump bodies have been announced by Daybrook Hydraulic division, L. A. Young Spring & Wire Corporation, Bowling Green, Ohio.

Known as series 803, 930, and 1030, each is said to offer special safety design features: "dirt-free" sloping running boards, tailgate horizontal bracing and bottom structural channel, which prevents the accumulation of dirt, stone, or free material during loading of the body.

These bodies are offered in a range of capacities from 3 to 12 cu. yd. and in standard body lengths and widths. Other features include reinforced, heavy-duty understructures; rugged, full-height corner posts; an improved design, double-acting tailgate that is 50% stronger with practically no increase in weight; a choice of heavy-duty hardware; and a new, improved method of adjusting tailgate spreader chains.

For more details circle 131 on Enclosed Return Postal Card.

"Curb Mule" Voids Curb Forms

A "Curb Mule" that eliminates the need of curb face forms in pouring concrete for curbs and gutters has been introduced by Midwest Metal Stamping Co., Kellogg, Iowa.

"Curb Mule" Sliding Form

The sliding form makes possible continuous pouring of integral curb on slab or curb and gutter. Of all-steel construction, the form is 86 in. long and 27 in. wide. Adjusting bolts on the cross ribs permit changing the angle of the face sheet to conform with the variation that might occur where the crown of the slab meets the curb line. An angle running lengthwise at the back provides for the proper guiding of the sliding form on the 6 in. curb back form. The forms may be ordered to conform to any special profile the contractor may require.

For more details circle 132 on Enclosed Return Postal Card.

Power Steering for Graders

Gyde-Master

A power steering unit, the Gyde-Master, introduced by Precision Controls Co., 5038 Chowen Ave., South Minneapolis 10, Minn., is an hydraulic-powered steering booster incorporating control valve and power section in one compact housing. The Gyde-Master performs all the functions of any power steering device, whether accessory or factory installed. It is claimed to provide effortless turning for the operator, to hold the vehicle on its course and to absorb road shocks applied to the front wheels. Because it replaces the operator for almost all steering operations, it reduces the time spend watching the vehicle and allows more time for manipulation of implements, speeding work and reducing operator fatigue. Gyde-Master can be connected into and operated by the vehicle hydraulic system, provided the vehicle system is suitable, thus accomplishing an economical installation. If the vehicle has no hydraulic system, the complete hydraulic system is available from the manufacturer. Mechanical steering is preserved through the Gyde-Master so that steering can be continued in the event of an hydraulic power failure.

For more details circle 133 on Enclosed Return Postal Card.

Galion Transporter

Tandem Axle Trailer Dump

A new 30 cu. yd. tandem axle trailer dump has been announced by Galion Alsteel Body Co., Galion, Ohio.

Known as model STMF Transporter, the trailer dump is intended for use with single rear axle tractors. It is fitted with a front-mounted Uniscopic single cylinder telescopic hoist which shifts hoist weight forward onto the tractor axles. This permits additional loading of the trailer axles and increased payloads, the manufacturer states. Matched design of Uni-scopic hoist, chassis and body is said to afford unexcelled stability, both on the highway and when dumping. Model STMF can be used for direct dumping into road surfacing machines.

Offered in body lengths from 19 to 26 ft., Model STMF Transporters have payload capacities of 10 to 40 cu. yds.

For more details circle 135 on Enclosed Return Postal Card.

Angle Dozer Attachment

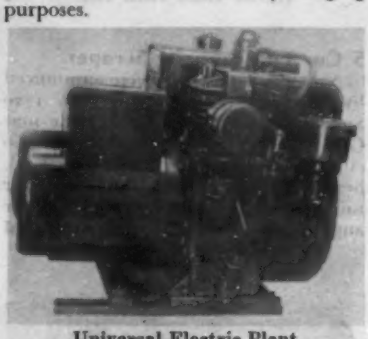
Davis Angle Dozer Attachment

A new angle dozer attachment for the Davis loader has been announced by Midwestern Industries, Inc., Wichita, Kans. With this attachment the operator can back fill by "shaving in" the dirt while running parallel to the ditch. The new Davis angle dozer attachment has a unique angling device as well as three offset adjustments. By pulling 2 pins, the angle dozer attachment can be offset 7 in. to either side of center. The tilt and "bite" of the blade is hydraulically controlled. The blade has a heat-treated cutting edge. With its 28-in. moldboard height and 72 in. width, the new product is stated to be suitable for all ordinary types of ditch back filling.

For more details circle 134 on Enclosed Return Postal Card.

Portable Power and Light Plant

An entirely new self-contained electric plant, announced by Universal Motor Co., 463 Universal Drive, Oshkosh, Wisc., develops 1500 watt 110 volt AC in a packaged unit taking less than 2 sq. ft. of space. Powered by a heavy-duty, 1-cyl. air-cooled engine, the new model 51-B has an oversize generator. It has two convenient "twist-tight" outlet receptacles for connecting lights, appliances or power tools. All electrical equipment is completely enclosed. Convenient push-button starting is another feature of the plant. A special 12-volt winding on the generator acts as a starter and also provides 300 watts of 12 DC for battery charging purposes.



Universal Electric Plant

For more details circle 136 on Enclosed Return Postal Card.

(Continued on page 170)

QUARRY SITE BONUS

(Continued from page 58)

For fill construction where the new fill extended out into the river from the existing bank, the problem was to remove unstable or unsuitable material from the slope, and terrace it so as to key the new fill with the ground. Overburden of soil varying in nature was removed by dragline and dozer. Simultaneously, work began on under-water excavation down to good rock, sand or gravel strata, as a preliminary to constructing the new embankment with high grade material from the toe upward. Excavation was carried 7 to 20 ft. below low water level.

The soupy material was bailed out by a Northwest 80D with Hendrix dragline bucket, and deposited on a shelf back of the machine, where it was given time to dry. At another stage, with the dragline sometimes located higher up, this material was rehandled to a pile at the top of the bank, where it was bulldozed into position as fill material if of passable quality or loaded into trucks for wasting.

No material from the bank side excavation was allowed to be dozed into the river. Every reasonable effort was made to avoid creating turbidity in this highly industrialized stream.

Of the 244,000 cu. yd. of unclassified excavation, something considerably less than half was underwater removal, the rest being material cut back in scalping the bank slopes. Benching of the slopes was done largely by dozers.

• *During several periods* of high water, the problem in constructing the toe of the fill was to be ready with rapid truck delivery of rock so that the filling would progress within minutes after the dragline had taken out the soup.

Rock fill was placed in 2 ft. lifts using a dozer for spreading and a Buffalo-Springfield 3-wheel steel roller for keying. The face of the new fill was topped out with rock, as shown in the accompanying sketch.

Earthlifts were rolled with a D8-tractor-drawn sheepsfoot unit, a close-coupled rig which could scamper around in rough situations. This roller with 550 psi unit weight on feet was used under an open specification which left the compaction method to the contractor. The fill was brought up to within 12 in. of template grade, and final topping left to the paving contractor.

The project included reconstruction of two panels of an overhead railroad trestle to provide clearance for the new roadway. Also installation of culverts, including Armco multi-plate pipe in sizes 144 in., 96 in. and 84 in. Box culverts were subcontracted to Concrete Construction Co., Charleston.

In addition to the equipment already enumerated, the contractor had on this job a Lorain Dixie motor crane (clamshell work, drop ball, and backhoe for culverts); a total of four D8 dozers, two D6s (for clean-up around shovels); two Cat 12 graders; one 600 cfm Chicago Pneumatic compressor; a Gardner-Denver Air Trac drill; Littleford storage buildings for caps and explosives; 2 Euclid rear-dumps, 2 water trucks (one of modern streamlined design by Teer's men); 1 grease truck and a field shop; 1 wrecker (for emergency service along the highway).

(Continued on page 150)

here's "HEAVYWEIGHT" POWER PERFORMANCE
in a light weight, man-size
WISCONSIN
Air-Cooled
ENGINE
the NEW
56 H. P.
Model VR4D
4-Cylinder Engine
• Climaxing years of engineering development, this great new engine offers manufacturers and users of power equipment all the advantages of AIR-COOLING, at temperatures from low sub-zero to 140° F., in an exceptionally rugged engine that measures up to any "heavy weight" industrial type liquid-cooled engine, horsepower for horsepower, with many *plus values.*
The outstanding High Torque characteristic of the Model VR4D engine, combined with its extremely rugged construction and heavy-duty stamina, provide *load-lugging holding power,* long life and top power performance.
Advanced "V" design provides an extremely compact power package which includes all traditional Wisconsin heavy-duty features such as tapered roller main bearings plus additional new features.
•
This new engine rounds out a complete line, comprising 15 models in 4-cycle single cylinder, 2- and 4-cylinder sizes, from 3 to 56 hp. Write for "Spec" Bulletin S-207.
Model VR4D Open Engine with heavy-duty clutch, rotating screen, electrical equipment and pre-cleaner.
MOST H.P. HOURS
WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN
. . . for more details circle 366 on enclosed return postal card

Here's the greatest Steel ....ever offered!

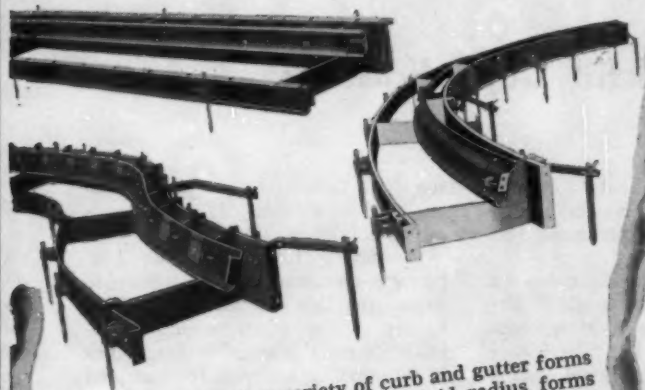
HIGHWAY AND AIRPORT FORMS

Redesigned Road Forms engineered by America's foremost form builder, are stronger, easier to align, faster setting than ever before. Built to contractors specifications, these new forms will take plenty of punishment and give years of service. They are now available with or without upturned base flange.

Heltzel's husky Dual Duty Forms have long been the favorites of contractors who build airport runways and ramps. These forms come in a number of double faces to enable contractors to pour two slab thicknesses with the same form.

Form Value

CURB AND GUTTER FORMS



Heltzel builds the widest variety of curb and gutter forms in the industry. Straight, flexible or rigid radius forms for any face and style. You'll want to know about the combined curb and gutter forms with the interchangeable sections that permit many styles from the same basic set . . . a real cost saver!

SIDEWALK FORMS

Here's an improved design sidewalk form with built-in Heltzel quality that assures lifetime performance. Division plate slots are spaced in one foot increments for better pouring practice.

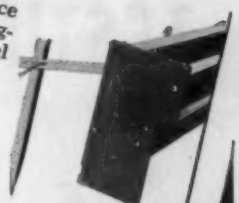
CURB FORMS

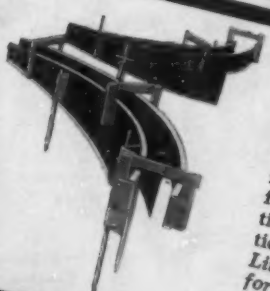
Heltzel Curb Forms now have full length stake pockets that add to form rigidity—make staking faster, more positive. Forms are made of prime steels

that have rerolled rail stakes. Battered or straight face in straight, fixed or flexible radius styles immediately available in any desired quantity.

Partially battered curb forms are available in two different types. Contractors can have either the single or two piece form. Both have the strength and ruggedness that is typical of Heltzel Steel Forms.

Adjacent forms for adding curbing to slabs already in are available in the widest variety of combinations.





SPECIAL FORMS

Whatsoever your forming needs it pays to specify Heltzel Forms. Heltzel will build forms to meet any specifications — for islands, foundations, driveways, piling, etc. *Literature available on all form types and styles.*

247

HELTZEL STEEL FORMS

THE HELTZEL STEEL FORM AND IRON CO., 410 THOMAS RD., WARREN, OHIO

. . . for more details circle 297 on enclosed return postal card

● Jetting backfill. Note coupling and hose connection.

● Showing settlement was accomplished in one 16-ft. ditch.

Aluminum Jet Pipe Aids Backfill Consolidation

EDWARD KEEBLE, contractor of San Jose, California, for years has been using 1-in. streams of water under pressure to compact his ditches after they are filled. He calls the process "jetting."

Two workman can compact about 500 ft. of ditch per day, running as deep as 16 ft. Each man handles a length of 1-in. pipe about 12 ft. long which is connected by a 1-in. hose to faucets on a portable aluminum 4-in. pipeline.

The pipe is thrust straight down a few inches into the soft backfill. The pressure of 80 psi or so then keeps working or "pulling" the pipe deeper until the lower end has penetrated to the ditch bottom. As the pipe lowers itself the jetting saturates the soil, aiding consolidation.

By having 1,000 ft. of the 4-in. portable aluminum pipe, it is possible to use the line continuously without having to stop when moving to another location. The 20-ft. long pipes in the pipeline are quickly connected

ACCURATE LABORATORY OR JOB-SITE TESTING... } improves quality control
prevents over-design
lowers project costs
ON ALL CONSTRUCTION!

Engineering Test Apparatus for Soils, Construction Materials, Concrete and Asphalt ranging from single items to self-contained Mobile Laboratories are available for immediate shipment.

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4711 WEST NORTH AVENUE · CHICAGO 39, ILLINOIS, U.S.A.

. . . for more details circle 372 on enclosed return postal card

and disconnected from the central carrying point of the pipe. One man carries two or three lengths of the lightweight pipe. Sometimes 30 ft. or 40 ft. lengths are used.

When Keeble first bought a portable aluminum pipeline, he got one with a coupler that was actuated by a spring. Sand and dirt got into the spring, with the result that latching was not complete and when the water was turned on, the pipeline flew apart under the water surge. By looking around, he found the only type of coupler in which the latch is positively forced closed by the force of inserting the pipe. Since then, he has had no trouble.

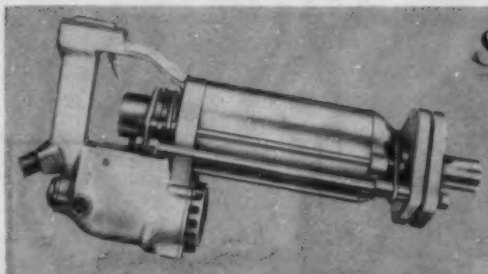
Keeble uses the pipeline on all ditch and compacting jobs, either jetting or, by adding risers and sprinkler heads every 20 to 40 ft. as a sprinkler system to soak down the ground. Originally the pipe was bought to compact the sand during construction work at Ford Ord, California; since then it has been used in various parts of the state. Keeble has tried the line to carry compressed air with varying but generally unsatisfactory results.

Flexibility of the pipe at the couplers permits a bend of about 17 degrees at each coupler, thus allowing the laying of the pipe over uneven or hilly terrain.

Plan Conference to Discuss Education, Engineering

The Western Society of Engineers, with headquarters in Chicago, will provide local sponsorship for a conference on the fundamental status of higher education in relation to engineering, science and technology. The meeting will be held at the Edgewater Beach Hotel in Chicago, Oct. 31, Nov. 1-2. It will be sponsored by the Engineers Joint Council, the Scientific Manpower Commission, the National Science Foundation and the National Academy of Sciences–National Research Council.

The conference will (1) provide an up-to-date picture of the technical manpower problem and its implication for educational resources; (2) highlight the unique problems of higher education in engineering and science and explore remedial measures; (3) contribute to general understanding of problems of higher education in technology and the need to rally our nation's resources to meet the challenge. For further information write or call the Western Society of Engineers, 84 E. Randolph St., Chicago, Illinois.



SYNTRON
ELECTRIC HAMMER DRILLS

. . . the only Electric Hammers available with automatic, self-rotating drill bit.

SYNTRON Electric Hammer Drills are designed for fast, easy drilling in concrete. Constructed for long, dependable service, employing the electromagnetic principle, they will maintain their efficiency day after day with a minimum of maintenance. SYNTRON'S exclusive automatic rotation of drilling bits provides ease of handling in any position. Available in sizes to meet every drilling need. Capacities from 5/8" to 2" diameter.

Builders of quality equipment for more than a Quarter-Century.

Write for complete catalog data — FREE

Write to SYNTRON COMPANY
384 Lexington Ave. Homer City, Penna.

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PULL IT WITH RUBBER!

Versatility Meet latest specifications for high speed compaction with Tampo 50 ton models designed to get full power from rubber tired tractors. Efficient on wet, silt and clay fills.

Stock Tongues Interchangeable tongue designs for two and four wheeled tractors make proper connection to the tractor king post. Available for Euclid, Caterpillar, and Model C Tournamatic. Write today for other models.

Wheel oscillation gives equal pressure and kneading action. Tire air pressures from 90 to 150 psi compact soft spots and voids.

TAMPO MANUFACTURING COMPANY
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SAN ANTONIO, TEXAS • PHONE: PE-3-9171

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BIG JOBS or small . . .

ARROW MOBILE HYDRAULIC HAMMERS WILL SAVE TIME, MONEY and TROUBLE

Whether it is breaking up huge sections of road or airport runways—or making a service cut in asphalt, you can depend on ARROW MOBILE HYDRAULIC HAMMERS to do the job better and at lower cost. Contractors, public utility firms, cities and counties, across the country and outside are finding the ARROW a real money-making, money-saving machine. Get *all* the facts—then you'll get an ARROW.

ASK YOUR DEALER FOR A DEMONSTRATION

ARROW MANUFACTURING COMPANY

194 WEST DAKOTA DENVER, COLORADO

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WHY Hand-Stitched Leather Covers Give EXTRA LONG WEAR

- CLOSER STITCHING HOLDS TIGHTER
- UNIFORM STRESS PREVENTS TEARING

LUFKIN CHROME CLAD **ANCHOR** STEEL TAPES

The everlasting choice in long steel tapes! Handsome, top-quality, leather case is hand-stitched over rust-resisting metal liner. Hand-stitching ensures a better, longer wearing outside cover. Exclusive Chrome Clad line is rust and corrosion resistant—will not chip, crack or peel. Bold black markings can't wear off. 25-50-75-100 foot lengths.

BUY **LUFKIN**

TAPES • RULES
PRECISION TOOLS
FROM YOUR SUPPLY STORE

THE LUFKIN RULE COMPANY
SAGINAW, MICHIGAN

400 BETTER MEASURE WITH

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QUARRY SITE BONUS

(Continued from page 145)

General tires were the standard for the 25 trucks.

The South Side Expressway project, for which grading is now largely done, is under the direction of Wm. R. Burton, project manager for Nello L. Teer Company. The project is part of the arterial program of the West Virginia state road commission, M. L. O'Neale, chief engineer.

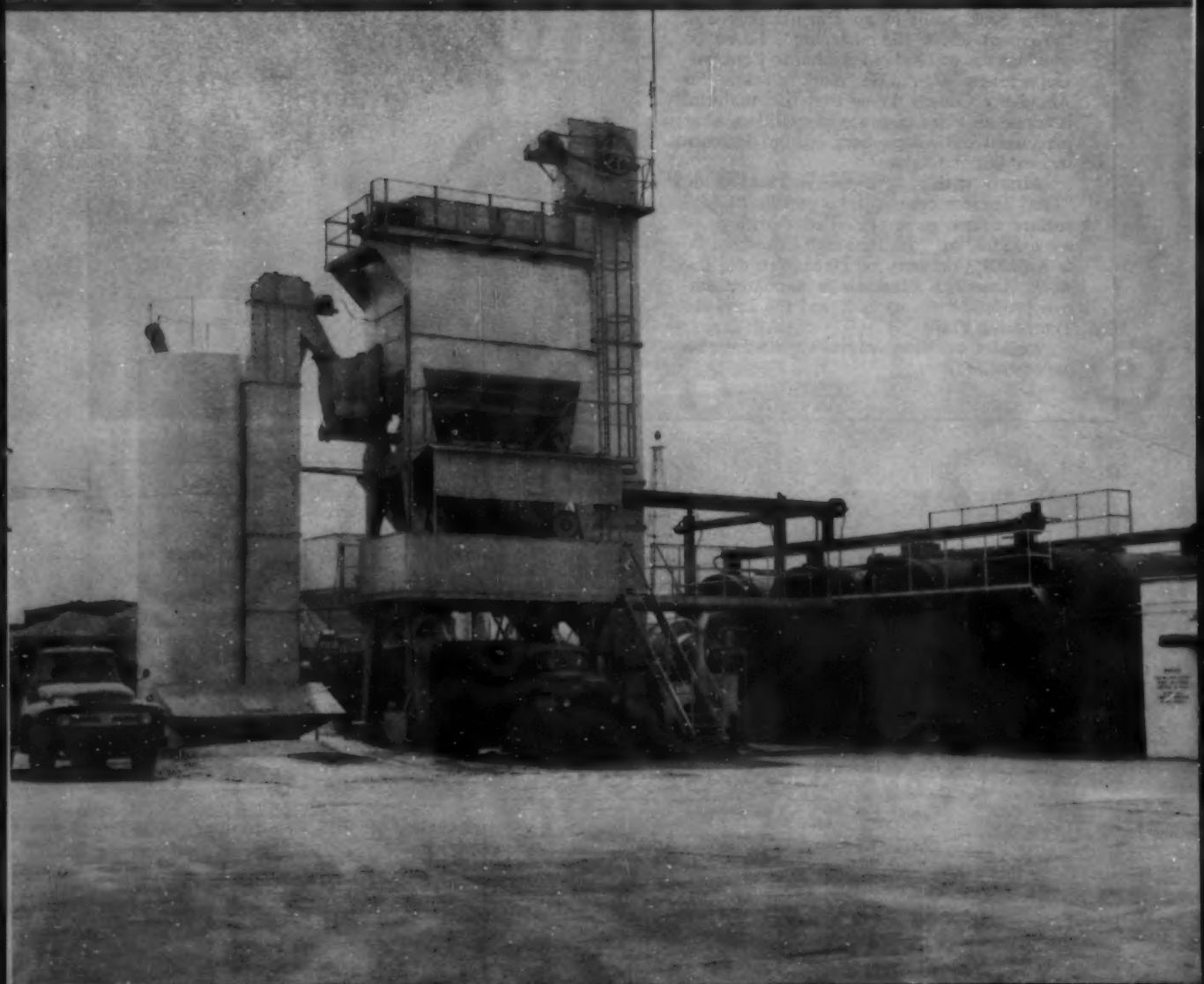
4th Engineering Productivity Conf., Boston, Sept. 17-19

A fourth in the series of National Conferences on "Increasing Highway Engineering Productivity" will be held at the Somerset Hotel in Boston, Massachusetts, on September 17-18-19, 1957. Accommodations for those planning to attend the conference can be secured by writing direct to the Hotel Somerset. The conference will be sponsored jointly by the American Assocation of State Highway Officials, the Association of Highway Officials of the North Atlantic States, the Massachusetts Department of Public Works, the Massachusetts Institute of Technology, and the U. S. Bureau of Public Roads. (The previous three conferences were held in Chicago, Illinois; Atlanta, Georgia; and Los Angeles, California).

As announced by H. A. Radzikowski of BPR, all engineers, officials, engineering consultants, university affiliates, associations, and engineering correspondents interested in the development of improved productivity in the field of highways and other closely allied civil engineering fields are invited to attend. The agenda for the conference includes applications of electronic computation for engineering purposes, photogrammetry, and other timesaving highway engineering methods, procedures and devices that have been developed since the recent Los Angeles meeting on this subject. Actual demonstrations are included as part of the agenda.

The American Road Builders' Association and other industry and highway engineering groups are also supporting the meeting. The major manufacturers of electronic computers and other highway engineering tools and devices will demonstrate the highway engineering applications of their equipment.

Bituminous ROADS AND STREETS



"White collar clean"—describes this spic-and-span aluminum painted asphalt plant, owned by Armour Excavating, Inc., of Philadelphia. See page 155 for the all-electric heating and other details of this plant which is of Standard Steel manufacture.

Published by Gillette Publishing Company
29 West Adams Street, Chicago 3, Illinois

AUGUST, 1957

Nationwide service on Bitumuls & Asphalt for every paving need...all from one source!

PENNSYLVANIA: Laykold® Asphaltic Concrete solves a tough paving problem on the Liberty Bridge, a major approach to downtown Pittsburgh. (When it comes to pavements, bridges are notoriously "bad actors" because expansion and contraction of the deck result in an unusual degree of movement under the surfacing). Based on previous use of Laykold Asphaltic Concrete, Department of Public Work officials for Allegheny County knew that this material retained an extra measure of resilience after placement and compaction, with no decrease in load-bearing value.

Mixed with slag aggregate, a 120 lb. "LAC" binder course and a 100 lb. "LAC" surface course were placed over an area of some 32,000 sq. yds. Trumbull Construction & Asphalt Company of Pittsburgh did the work. American Bitumuls & Asphalt Company supplied the asphalt and the Laykold Tempering Fluid.

Results to date: excellent service; no pavement failures.

CALIFORNIA: Across the nation, on the Pacific Coast, the State of California Department of Highways let a half-million-dollar contract for re-surfacing 41 miles of U. S. Highway 99 to the Schroeder Company, of Sun Valley, California. For this job, American Bitumuls & Asphalt Company supplied: 1,700 tons of Air Refined Asphalt; 3,500 tons of Paving Asphalt; 140,000 gallons of Bitumuls® Emulsified Asphalt.

LOUISIANA: While "down South," on the construction of a road for private industry at Grand Isle, La., American Bitumuls & Asphalt Company supplied Bitumuls Emulsified Asphalt for 20,000 sq. yds. of 3-course surface treatment work on which *clam shells* were used as aggregate. As cover aggregate, shell produces a long-wearing surface.

Whenever . . . and wherever . . . your paving job calls for asphalt or asphaltic products, call our office nearest you. *That's your single source for all your asphalt requirements.*

American Bitumuls & Asphalt Company

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Inglewood, Calif. Oakland 1, Calif. Portland 7, Ore.

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Hyster makes a matched Towing Winch model for each of the Caterpillar-built Tractors.

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Easing equipment down steep slopes is only one of many utility jobs performed by instantly available winch power.

Bogged down scraper put back into action fast, cuts production loss, increases profit.

Dependable, closely controlled winch power makes this job go faster.

Tough bulldozing jobs like this are possible with steady, reliable Hyster winch power.

Higher production is possible when other machines get assistance from tractor-mounted winch.

Caterpillar and Cat are registered trademarks of the Caterpillar Tractor Co.

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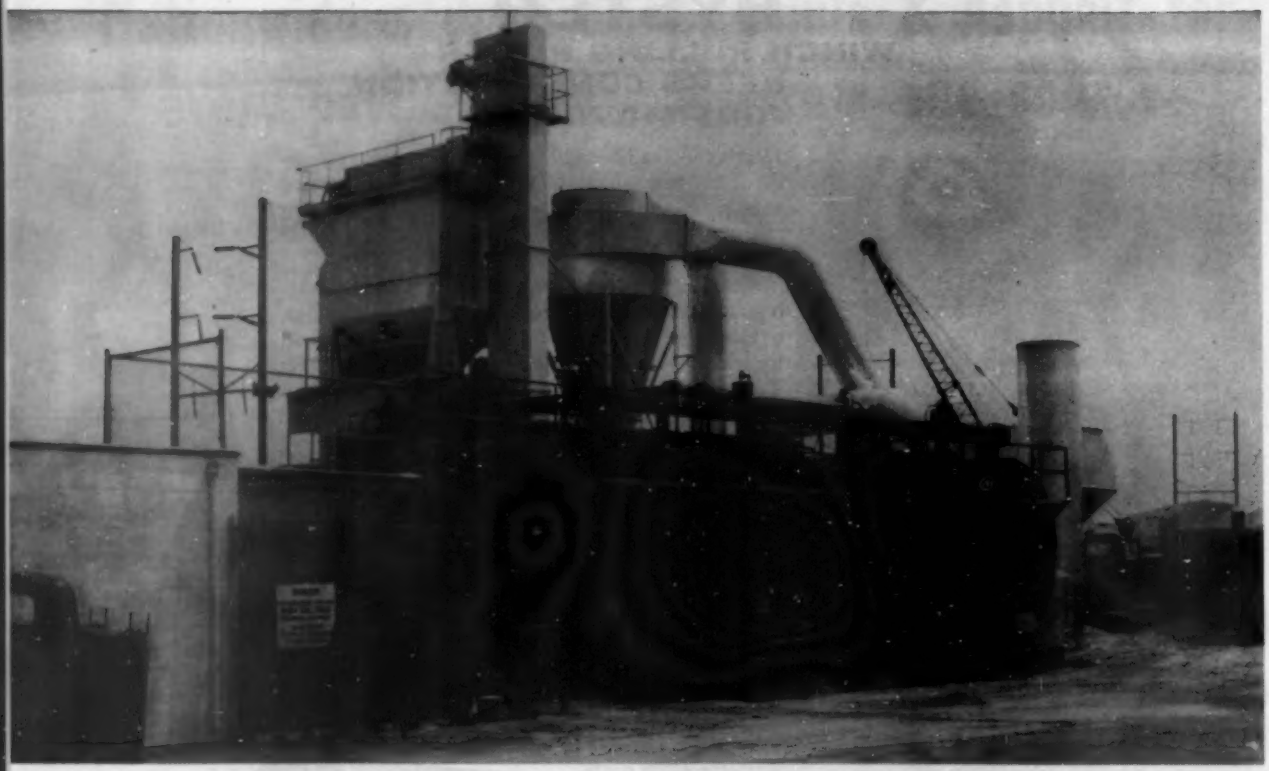
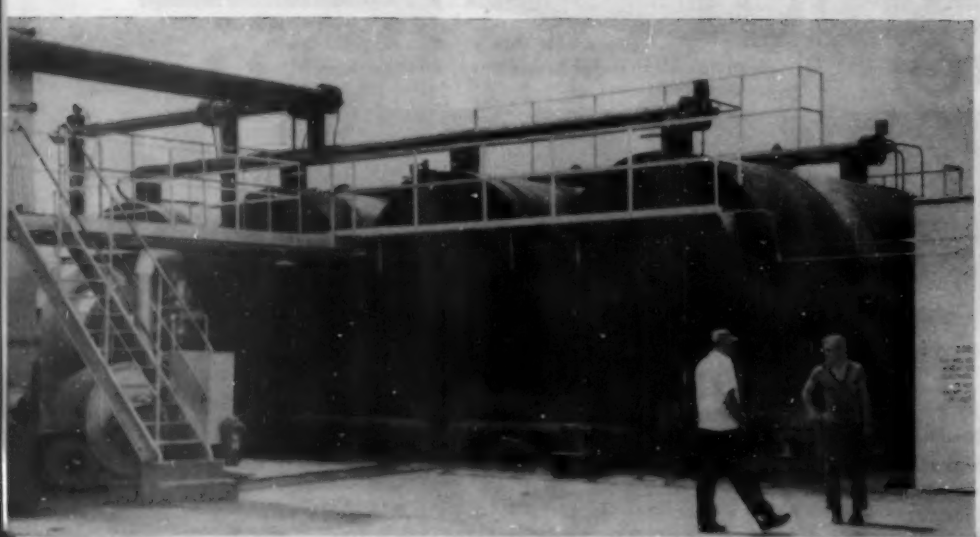


● Four 12,000 gal. asphalt tanks as seen from rear of plant. The white rectangular objects on each tank are terminal boxes for some of the heat control equipment.

● This neat building, immediately alongside the asphalt tanks, houses the electrical controls and (far door) light repair equipment. Note how clean the yard is kept.



● Front view of the electrically heated storage tanks, showing the double insulated piping and glimpsing the burner end of the drier.

All-Electrically-Heated Asphalt Plant

- Owners report excellent operating economy, with practically no maintenance to date.
- Basic design and spic-and-span housekeeping make this plant "cleanest you ever saw."

ON THE northern edge of Philadelphia is an asphalt plant which is much-talked-of in the area for two reasons. One is that its heating is all-electric. The other is that the plant and yard are kept so clean that you have to look twice to see whether it *is* an asphalt plant.

Of these two somewhat unrelated aspects, the heating will be described first.

This is a "Standard" 4,000 lb. plant, manufactured by Standard Steel Corporation and owned and operated by Armour Excavating, Inc. The firm, which is also identified with earthmoving and general street work, supplies its own asphalt needs, and also mix to other contractors and to city, county, state and other government bodies as well as for subdivision and private driveways, parking areas, etc.

The heating and storage part of the plant was engineered in 1955. As described in *The Plant* by William Sellers, the assembly includes four 12,000 gal. tanks for asphalt materials, equipped with low density (about 3 watts per square inch) tubular heaters. The heaters each consist of a series of 3-in. seamless pipes running the full length of the tank, designed to allow for free expansion and contraction. The tubes at one end are carried outside and away from the tank and terminate in a weather-proof terminal box. Inside each tube is a specially constructed nichrome resistance element. Tanks are insulated with 3 in. of weatherproofed insulation.

Heating of each tank is controlled by a 2-stage indicating thermostat at the tank and a special control panel at the control center. Each control panel is equipped with a disconnect switch, fuse blocks, magnetic contactors, control circuit transformer, pilot lights, selector switches for heat stages and a seven day clock. The operator can adjust the clock so that the tank heaters are allowed to operate only at night, on off-peak hours, or when the plant is not in operation. The insulation retains sufficient heat to allow the tanks to drift during the day.

As it has worked out in practice, asphalt is delivered at a higher temperature than is required at the mixing platform. When the plant is busy, enough excess heat is added to the asphalt storage during the day, by tank truck deliveries, that the tank heaters are seldom required to go on at night.

In pipeline heating, possibly the most significant improved technique is the method of heating the 4 in. pipeline to and from the mixing tower and on the tank filling system. Inside each section of piping is installed a 2 in. seamless tube with centering guides. Inside the 2 in. tube is a low density element similar to the type used for tank heating. The heating unit is so arranged that either the special nichrome element or the 2 in. tubular sheath may be removed from the 4 in. pipe without disturbing the 3 in. insulation.

The asphalt is conveyed between the 4 in. and the 2 in. pipe. This gives an equivalent area of better than a 3 in. pipe. The watt density of the 2 in. sheath is approximately one-half of a watt per sq. in. of sur-

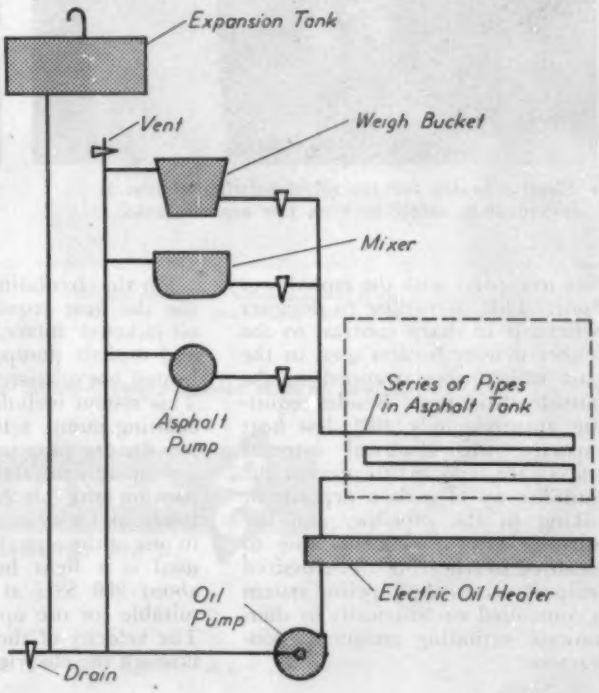
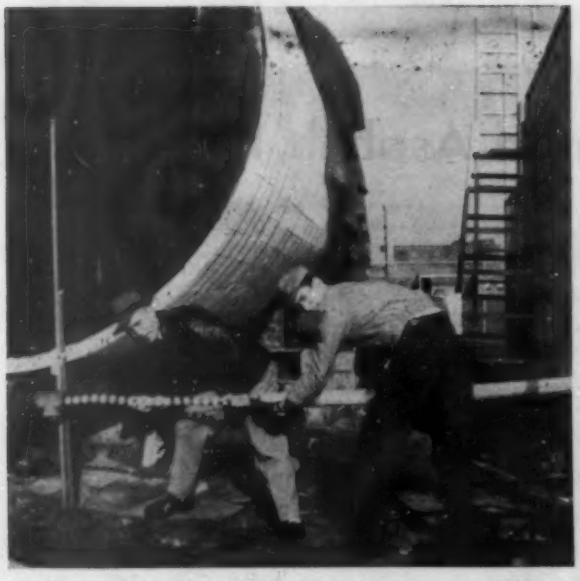
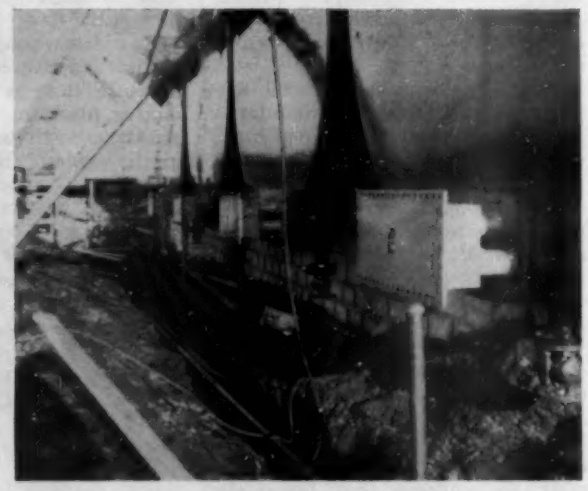


Fig. 1. Diagram of circulating heated oil system for warming weigh bucket mixer and asphalt pump. (Courtesy *The Plant.*)



• (Left): One of the electrical heating elements, this one 42 ft. long, is shown being run into the internal pipe tracer. (Right): Electrical terminals for heating elements in insulated lines carrying asphalt to and from the mixing platform. (Photo courtesy "The Plant".)

• Electric heater for the oil circulating system is tucked away safely between two asphalt tanks.



• View during construction shows terminal boxes and conduits for tank heaters before insulation.

face in contact with the asphalt per hour. This, according to designer Sellers, is in sharp contrast to the higher density heaters used in the past which were strapped to the outside of the pipe. Besides requiring approximately 40% less heat capacity, the electrical internal tracers are reported to prevent the building up of carbon deposits or coking in the pipeline, and the burning out of elements due to localized overheating. The desired temperature in the pipeline system is controlled automatically by thermostats actuating magnetic contractors.

For the circulating system to handle the heat requirements of the oil-jacketed mixer, weigh bucket and asphalt pump, an electrically heated hot oil system was installed. This system includes a hot oil circulating pump, a 16 kw multi-pass low density (approximately 7 watts per sq. in.) tubular heater, an expansion tank located on the mixing tower, and a series of parallel pipes in one of the asphalt tanks. The oil used is a light heat transfer oil about 200 SSU at 0 deg. F and suitable for use up to 500 deg. F. The velocity of the oil circulating through the electric heater is in excess of 4 ft. per second (Fig. 1).

The expansion tank is located to insure a positive head of oil on the system at all times and is tied into the system in such a way that the oil temperature is maintained close to ambient. Bleed connections are located at various points to eliminate any entrained air in the piping or jackets.

With this arrangement, there is reported to be no danger of oil breakdown or cracking from overheating in the heater. Also the design of the system has been notably successful in preventing the oxida-

(Continued on page 160)

Rowe Construction Co., Bloomington, Illinois, uses the Model 374 Conveyor, one of many types and sizes of Barber-Greene portables.

The president of Rowe Construction Co. reports

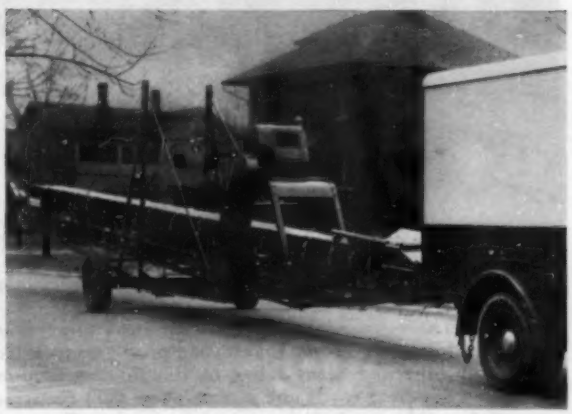
"Our next portable conveyor will be another Barber-Greene"

"We have given our Barber-Greene conveyor four years of hard service and its performance has been tops. We produce sand and gravel for highway departments and for our own use. So we move our plant three and four times a year. Towing our conveyor from job to job presents no problem at all. We just hitch it up to a truck and move out.

"And it was no big job to lengthen our conveyor from 51 to 60 feet. All we did was order a nine-foot intermediate section and bolt it into place. All carriers, returns and decking were already in place and aligned.

"With this kind of reliability and easy flexibility, we feel sure our next portable conveyor will be a Barber-Greene."

Straight-forward reports like D. H. Rowe's provide the proof of the superior performance and widespread acceptance of Barber-Greene conveyors. Handling coal, sand, gravel and other bulk materials, these versatile conveyors operate on a virtually automatic basis . . . cut labor costs substantially.



Not just portability, but road-ability is one of the many features that save time and money for the Rowe Construction Co.

Literature shows the many superior features of Barber-Greene portables. Write for your copy. 56-21-PO

Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

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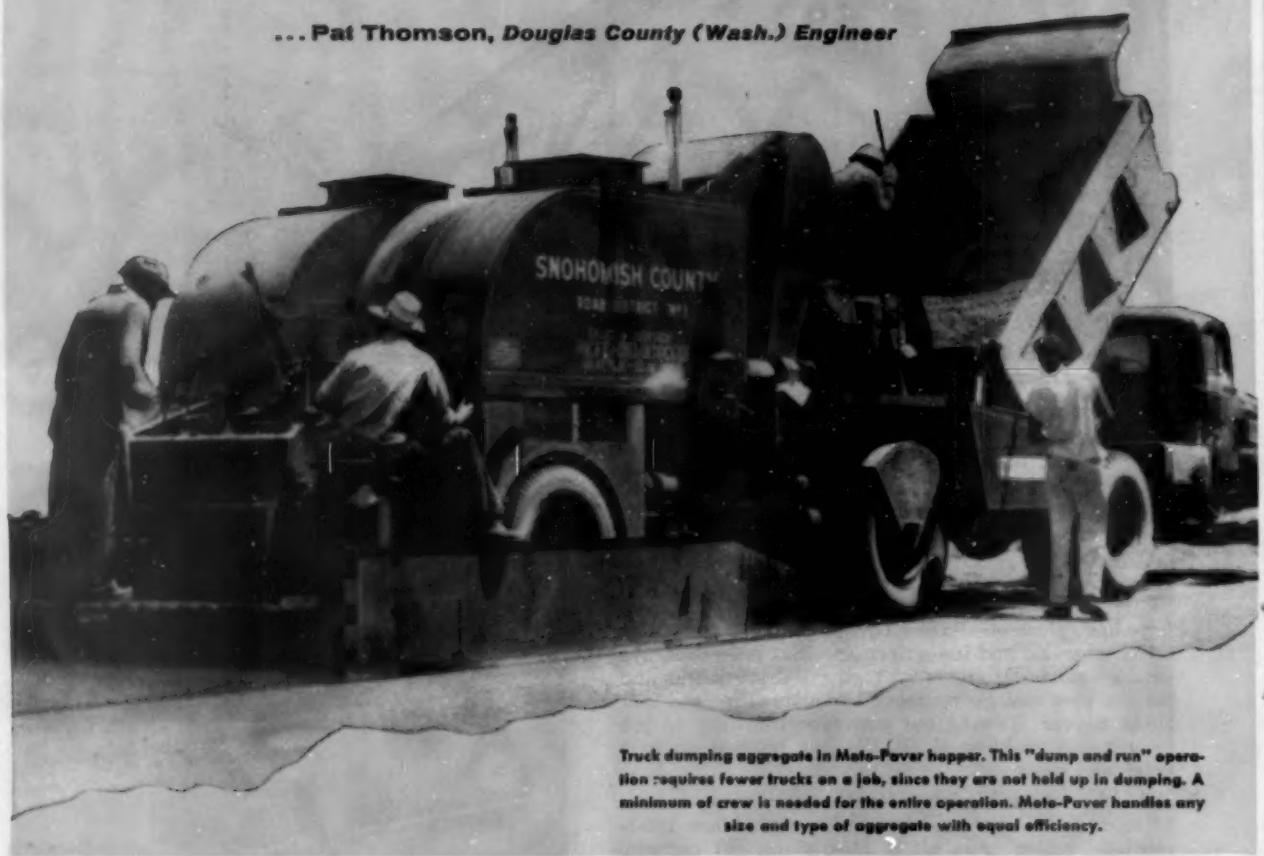
"we looked at our roads...we looked at our budget...then we looked for a solution...and found it in the

...Pat Thomson, *Douglas County (Wash.) Engineer*



Truck dumping aggregate in Moto-Paver hopper. This "dump and run" operation requires fewer trucks on a job, since they are not held up in dumping. A minimum of crew is needed for the entire operation. Moto-Paver handles any size and type of aggregate with equal efficiency.

or—how a county engineer saved his county $2 per ton on asphalt

Pat Thomson, like many other county engineers in the northwest, had some tough road problems to solve. He had inherited many miles of dilapidated road-mixed and concrete roads and streets. New dam construction jobs and new industries had jumped traffic on some roads and streets from 100 vehicles or less per day to as high as 7,000 vehicles daily. These streets were in dire need of widening—and resurfacing.

"But," says Pat, "Douglas County is not exactly rolling in filthy lucre. In fact, we are so tight fisted up here that we count our dollars by the penny, and know where each one of them goes. So—we watched our costs closely. We finally found our solution in the form of cold mix asphalt, with a Hetherington & Berner Moto-Paver. A Moto-Paver owner from Wenatchee studied our job and gave us a price of $6.20 per ton (approximately 52c per sq. yd. of cold mix in place under all conditions for a 1½ inch compacted mat.) This compared to a cost of $8.20 per ton of hot mix."

Earl Barnwell, another county engineer from Washington (Snohomish County), according to Pat Thomson, has one of the most terrific weather problems in the U.S. In some cases he has had to "dry out" road mixed windrows as many as six times. Using the Moto-Paver, the only wet aggregate, in event of rain, is that which would be enroute to the job. With the Moto-Paver, Snohomish County's average cost per mile for a 2" mat 20 ft. wide was $3,555.70, with an extreme low of $2,840 and a high of $4,020. As a result of their experience with this first Moto-Paver, Snohomish County expects to buy two

H&B ESTABLISHED 1903

HETHERINGTON & BERNER INC. • ***Engineers*** • ***Manufacturers***

701-745 Kentucky Avenue • Indianapolis, Indiana

H & B Moto-Paver"

Asphalt is brought to the job in tank trucks for quick loading of the machine. All of the Moto-Paver operation tends toward a minimum loss of working time.

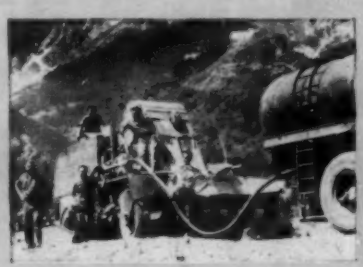
more such machines. Mr. Barnwell feels that while the Moto-Paver in no way supplants a hot mix plant, it does an excellent job of replacing old style roadmixing operations. The load in the machine is mixed and laid in approximately 2½ minutes, consequently there is no dangerous windrow of unmixed material left on the road. Traffic control is localized, cheap, and easily maintained. The extreme mobility that allows taking advantage of even one day of sunshine makes the machine especially useful for all rainbelt territories.

The above are just two of scores of examples that could be given to show how the Moto-Paver speeds the job and cuts the cost in resurfacing and maintenance work of all kinds. In the 12 years it has been on the market, Moto-Paver has established equally enviable records for efficient, economical production in many parts of the world under widely differing job and terrain conditions. In the mountains of Switzerland and Italy, the deserts of northern Africa, the tropical jungles of Central America, as well as in all sections of the U. S. and in Canada, Moto-Paver has met the requirements of all types of work under all kinds of conditions, using many different types of aggregate.

Bulletin MP-55, which gives complete information and specifications on the Moto-Paver, will be sent on request.

Moto-Paver
on Texas sub-division job

Moto-Paver
on Michigan road job



Moto-Paver
on Alps Mountain job, Switzerland

Moto-Paver
on Hayti job (Central America)

Moto-Paver
on Rome (Italy) Airport job

Moto-Paver building Forest Fire Prevention Road in France

ROSCO'S PRESSURE METERING MAKES THE DIFFERENCE AT ANY WIDTH!

Do you know . . .

that it's possible to apply bitumen through any length of spraybar from 1 to 24 feet *without changing the pressure and without any application adjustment?* It can be done with a Rosco! You would normally expect surges or drops in pressure to occur when sections of a distributor's spraybar are shut-off or turned on.

But . . .

NOT with a Rosco Distributor equipped with exclusive Pressure Metering. Even when as much as 23 feet of a 24-foot spraybar are shut-off, the precise, accurate delivery remains unaffected . . . the pressure in the working one foot stays the same as it was pre-set at the beginning of the run. The accurate delivery from the working nozzles is not affected . . . no matter how many feet of the bar are cut out.

No adjustments in truck or pump speed are required—in fact, with Pressure Metering the pump speed never changes and normal wear of the pump never affects the accuracy of the application. When any part of the spraybar is shut off, the excess material is automatically by-passed. Pressure at the operating nozzles stays the same. When additional nozzles are turned on, pressure is immediately available to supply them.

One control sets the pressure specified for the job. After that, pressure control is automatic . . . the operator can concentrate full attention to spotting the material properly on the road. Pressure Metering is an integral part of Rosco's patented Master Valve that permits one-lever control of all normal distributor functions. You'll find that Rosco's Pressure Metering is faster and more accurate —factors which can be the difference between a "make" or "break" job in today's highly competitive field. And Rosco's Pressure Metering assures you of jobs that will always meet rigid application specifications.

Let your Rosco dealer show you how Pressure Metering will pay off for you. Or write the factory for descriptive literature with specifications on Pressure Metering-equipped Distributors.

ROSCO BITUMINOUS DISTRIBUTOR with Pressure Metering. Front or rear mounted for truck or trailer.

ROSCO MINNEAPOLIS

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DISTRIBUTORS • MAINTAINERS • BROOMS
SUPPLY TANKS • TAR KETTLES • STREET FLUSHERS

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ALL-ELECTRIC PLANT

(Continued from page 156)

tion and sludging of the oil and eliminates the hazard that exists in systems where hot oil is allowed to be in contact with air. The electric oil heater, thermostatically controlled, is used for a few hous in the morning to bring the mixer, weigh bucket and pump up to operating temperature, by operating the circulating pump only, enough heat can be absorbed from the asphalt by the oil passing through the coil in the asphalt tank to keep the system at operating temperature. By this method the various pieces of equipment served by the oil system are heated without adding any additional electrical capacity or demand to what is normally required for the operation of the plant.

There is one Sellers-Wayne asphalt pump, independently electrically heated and controlled, used to transfer material from highway tankers to the storage tanks. Another is piped in parallel with a Blackmer pump for supplying molten asphalt to the mixing tower.

• *Power Conservation.* Primary power to operate the plant is purchased on a demand plus usage basis. As pointed out above, it is while the plant is in operation that the maximum amount of current is used and the demand upon which charges for power are made is established. The pipeline and the electrically heated fill pump (the latter representing a very minor part of total electric heating load) are the only components in the asphalt handling system which contribute to the established demand. Bulk of the electricity used for electric heating is purchased for usage charge only and at the most favorable rate.

In the design of this system, special consideration was given to maximum safety. Watt densities on heated surfaces in contact with asphalt and oil were kept to low values. Fail-safe thermostats were used on the tank heaters. Positive protection was provided so tank heaters could not be exposed by drawing down asphalt in the tanks. Although the electric heating is operated on a 440 volt, 3-phase power supply, control circuits of 110 volts were used throughout.

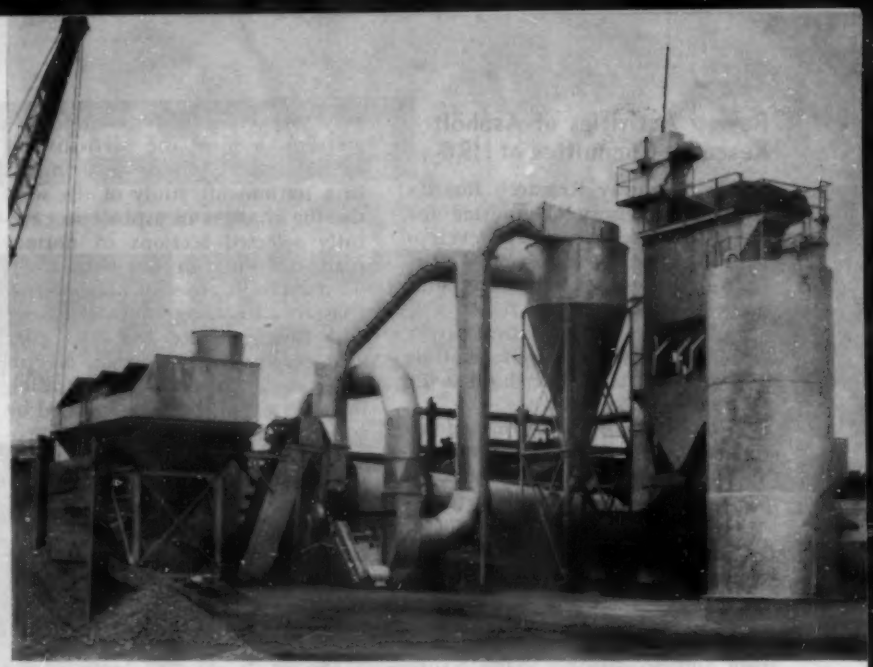
The electrically heated asphalt handling system was engineered by The Sellers Company, with the as-

sistance of James Armour, president of Armour Excavating, Inc. Hynes electric heating equipment, manufactured by Turbine Equipment Company, was used throughout in the installation.

The Standard Steel Model R-M 4000-lb. plant is fed by a ¾-yd. clamshell. This streamlined and simple to operate plant consists of a feeder bin with reciprocating feeder, a self-contained 6′ x 30′ dryer, and 4,000-lb. mixing unit with a 60-ton storage bin, 4′ x 12′ double deck vibrating screen, mineral filler elevator, and hot oil heater; and it is equipped with roller bearings throughout. One of the major features of this plant is the "Standard" combination Dust Collector and Wet Washer, assuring complete dust collection and elimination of all dust nuisance. This is the type of dust elimination equipment which has been supplied the manufacturer to alleviate dust problems on asphalt plants in many parts of the country where dust nuisance is becoming a critical problem.

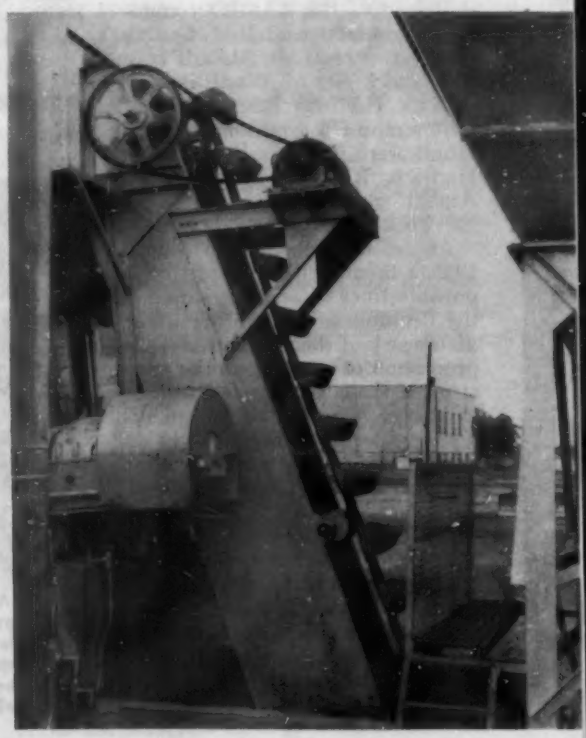
Asphalt of 60-70 penetration usually occupies two of the tanks, with 85-100 material in the third. Emulsified materials when used are fed direct from the tanker. Either cold and hot mixes are made on demand (considerable sheet asphalt tonnage). The plant with two men on duty easily produces 1,500 tons in a busy day. While the company interest has a fleet of dump trucks, much of the haul-away is done by customers.

● *Cleanliness.* And now a word about the good housekeeping for which this plant is widely known. All metal surfaces throughout the plant (with the exception of tanks and hot piping, which are black) are kept well painted with aluminum paint. The electric control house and adjoining office building, cement block structures, are maintained in a clean, white painted condition. The stone covered yard and drives are in keeping, being given a periodic dressing with the tractor-shovel bucket. Vigilance is exercised at all times to prevent or remove oil and asphalt droppings, pick up bits of paper and trash, etc. Structural surfaces are kept wiped clean. Dust is notably absent from the surfaces of the plant machinery because of the efficient dust collection system. All of this being part of a policy which the owners feel has paid off in good customer relations and by making the employes proud of their job and on their toes in mechanical maintenance and operation.



● **Details of dust collector and drier—another view of a plant which is kept clean and well-painted. Standard plant with 4,000 lb. pugmill.**

● **Details of cold elevator and drive.**



● **Unit crane working between stone and sand stockpiles at the Armour firm's plant.**

Review Activities of Asphalt Research Committee of HRB

The Highway Research Board's Ad Hoc Advisory Committee for Asphalt Research and Development was organized in 1955, with C. A. Carpenter as chairman and John H. Goshorn as secretary.

Significant events leading up to and culminating in the formation of the committee under the Board's auspices were as follows:

From informal discussions among representatives of state highway departments and of asphalt producers there developed a rather widely-held feeling that a joint research effort by representatives of these two interests might be constructive in developing new information on specific characteristics of asphalt that are related to service performance and on possible manufacturing processes to obtain this.

A proposal was made by the Asphalt Institute that the AASHO organize a committee to advise the Institute on needed research and development in connection with the manufacture of asphalt. The executive committee of AASHO recommended that this committee be organized under the auspices of the Board.

• *This latter proposal* was agreed to by the interested parties and the committee was thus established. In addition, F. V. Reagel, of Missouri, chairman of the AASHO committee on materials and J. M. Griffith, engineer of research, Asphalt Institute, and Elmer M. Ward, assistant director, Highway Research Board, were appointed ex-officio members. Funds were made available to the Highway Research Board by the Asphalt Institute for carrying on the work.

At the first meeting on May 6, 1955, a broad general discussion of possible lines of action resulted in the decision to confine the immediate work of the committee to the promotion of research on the properties of asphalt that are significant in the performance of pavements, such properties being held to include consistency, curing characteristics, adhesion and durability. It was agreed tnat one of the principal lines of research would be on asphalt in thin films by methods such as the Shell thin-film weathering test, the public roads thin-film test, and the California abrasion test as means of judging durability.

At the second meeting of the committee on January 15, 1956, a plan of action was developed to attempt to enlist the participation of the state highway departments in a nationwide study of the weathering changes in asphalt in carefully selected sections of normal road surfacing in order to learn what asphalts are showing superior resistance to change during mixing and during service and also what asphalts are failing to show acceptable resistance to change. Paralleling such a field study and guided by it as information develops, the producer group has promised to promote investigations, in the refineries, of all possible means of producing asphalt that will be especially resistant to change and to keep the committee informed of developments.

A task group consisting of F. V. Reagel, R. R. Thurston, A. E. Stoddard and R. J. Schmidt was appointed to prepare for the committee's consideration a "Minimum Data Sheet" that could be offered to the state highway departments for the accumulation and recording of data on the proposed selected test and observation sections in order that comparable information might become available throughout the country.

At the third meeting of the committee on January 8, 1957, the draft of the "Minimum Data Sheet," prepared by the task group, was thoroughly discussed and several revisions were made. The revised draft was then sent to the full committee for letter ballot.

The data sheet has now been approved and plans are being made for distributing copies to the state highway departments for their consideration of the proposed study.

At a meeting of the committee, to be held in Denver, Colorado, June 24-26, the states' practices of quality control were scheduled to be reviewed, with particular emphasis on recent developments in a few states. The possibility was to be discussed of coordinating these practices, as well as the need for further research by both the producers and consumers to accomplish this uniformity.

Improve Highway Fog Lights

Low-mounted white fog lights will be improved to the point where they will greatly better the penetration of fog along arterial highways. This news came from Charles R. Marsh, associate professor of electrical engineering, Pennslyvania State University where studies have been conducted by the Illuminating Engineering Research Institute for the past four years.

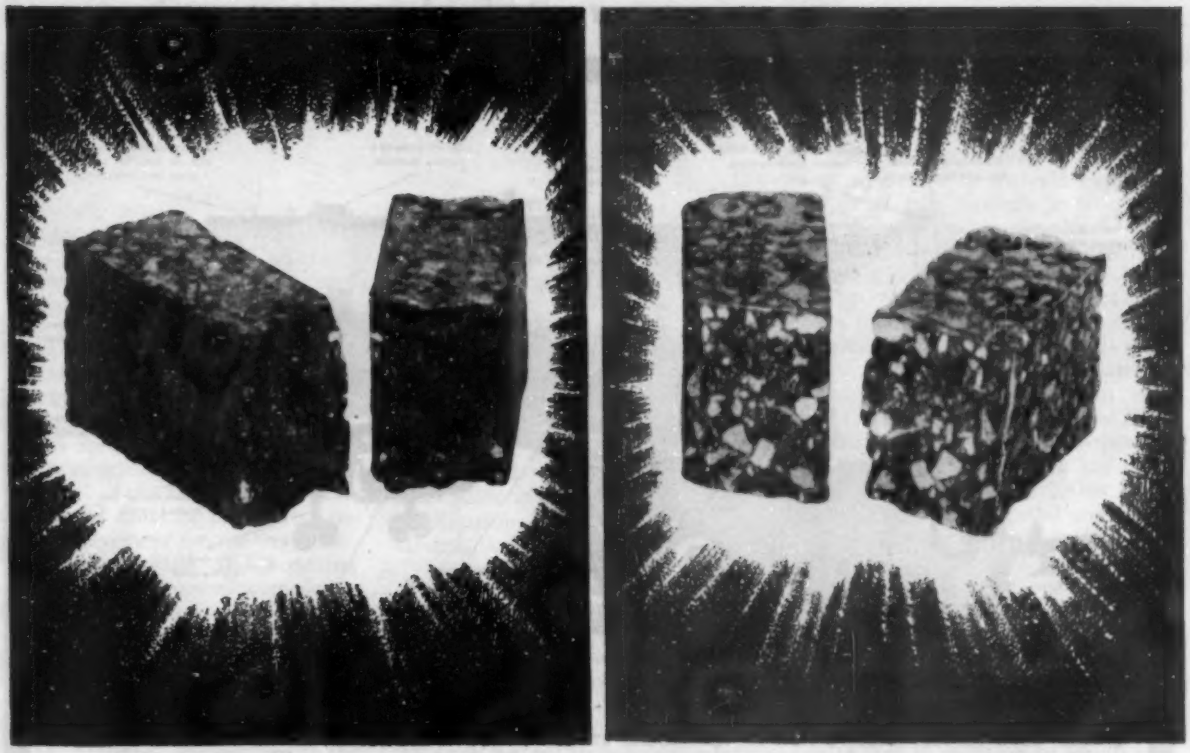
Fog has been a particularly serious problem on the New Jersey Turnpike and at other local areas along the coast lines. Several methods are still undergoing experiment, including overhead lights which direct beams vertically downward, reflectors mounted on the road shoulders, and low-mounted lights on the front of vehicles.

Robot Tractor Operation Demonstrated at Fort Belvoir

An operator is not needed on this tractor, which can be steered and worked anywhere within range of the radio control apparatus especially designed for it. This unique application has been developed by the U.S. Army Rsearch and Development Laboratory at Fort Belvoir, Virginia. The tractor is a standard commercial Tournadozer manufactured by LeTourneau-Westinghouse Company.

Naugatuck SURFA-SEALZ

RUBBER ADDITIVE FOR ASPHALT PAVING



This picture proves a point

THESE paving-surface specimens, compacted of aggregate and asphalt for standard impact tests, were forcibly broken apart by weights dropped from above. Just how and where they parted speaks volumes for the addition of *rubber* to asphalt or bituminous cement!

The specimen on the left (#1) contained *no* rubber; while the one on the right (#2) contained Surfa-Sealz® in the recommended proportion. It is quite evident that specimen #1 cracked and separated *through the asphalt*. On the other hand, in specimen #2, the very stones in the aggregate actually fractured before the rubberized asphalt binder yielded, under an impact many times greater than that which split specimen #1.

Call this a labortory test if you will, but what more convincing and practical demonstration is needed to prove the greater toughness and adhesion which Surfa-Sealz adds to asphalt? The advantages are even more pronounced at winter temperatures.

Very little imagination is needed to translate these facts into terms of more crack-resistant highway surfaces and greatly reduced maintenance costs.

US RUBBER

United States Rubber

Naugatuck Chemical Division

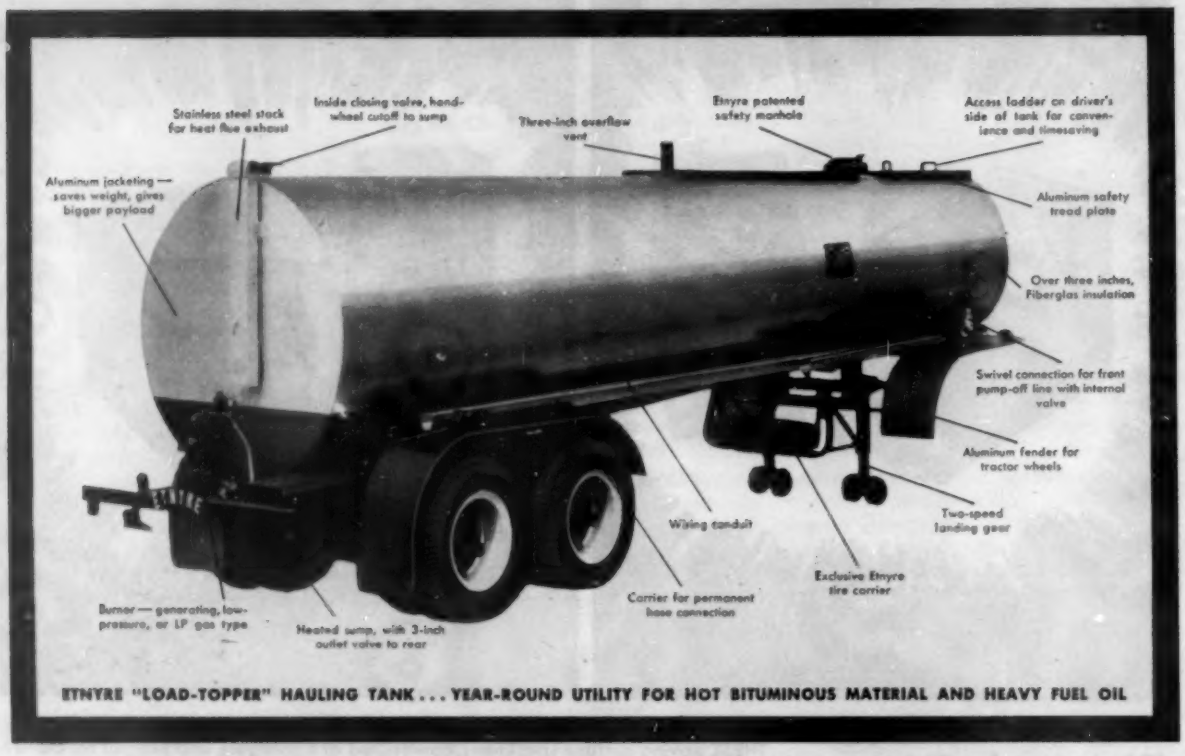
Naugatuck, Connecticut

BRANCHES: Akron • Boston • Chicago • Memphis • New York • Philadelphia • **Mfg.:** Naugatuck • Gastonia • Los Angeles • **CANADA:** Latex Div., Dominion Rubber Co., Ltd., Montreal • **Cable:** Rubexport, New York
Rubber Chemicals • Synthetic & Reclaimed Rubber • Plastics • Agricultural Chemicals • Latices

. . . for more details circle 328 on enclosed return postal card

NEW Taper-Shape FOR PROFITABLE ASPHALT HAULING

with over 3 inches of Fiberglas insulation


Stainless steel stack for heat flue exhaust
Inside closing valve, hand-wheel cutoff to sump
Three-inch overflow vent
Etnyre patented safety manhole
Access ladder on driver's side of tank for convenience and timesaving
Aluminum jacketing — saves weight, gives bigger payload
Aluminum safety tread plate
Over three inches, Fiberglas insulation
Swivel connection for front pump-off line with internal valve
Aluminum fender for tractor wheels
Two-speed landing gear
Wiring conduit
Exclusive Etnyre tire carrier
Carrier for permanent hose connection
Burner — generating, low-pressure, or LP gas type
Heated sump, with 3-inch outlet valve to rear

ETNYRE "LOAD-TOPPER" HAULING TANK . . . YEAR-ROUND UTILITY FOR HOT BITUMINOUS MATERIAL AND HEAVY FUEL OIL

Etnyre's history-making answer to strength, roadability, safety, lightness, payload, and drainage

In 1910, Etnyre introduced a round, insulated steel tank, with flues, to carry hot bituminous materials for their customers. Twenty-four years later an elliptical tank was introduced. Now, the first round, tapered tank, fully insulated, *complete with burners and flues,* is offered to transporters.

WHY A TAPERED TANK?

- Center of gravity substantially lowered, with tandems located further back.
- Structural strength greatly increased.
- Bigger pay loads within state laws.
- Rear visibility improved for greater safety.
- Improved handling ease.
- Complete, fast drainage.
- Maximum heat retention for longer hauls.
- Greater safety with Etnyre's patented relieving manhole cover.

Benefit from a new era in the transportation of asphalt, tar, and pitch. Capitalize on Etnyre's years of "know-how" with insulated tanks. Now's the time to get specifications and prices.... Write E. D. Etnyre & Co., Oregon, Illinois, U.S.A.

ETNYRE

"Load-Topper"

HAULING TANKS

. . . for more details circle 281 on enclosed return postal card

Nevitt's Comments on Asphalt Paving Problems for Airfields

To the Editor:

I have read with real interest Mr. Nevitt's article "The Challenge" contained in May Roads and Streets. For the past six years I have been more or less intimately associated with the results of performances of air field pavement under present Air Force plane traffic, including jets.

This splendid and thought-provoking article covers, however, only one-third of the real challenge that exists, and must be met before asphaltic pavement for runways, taxiways and parking and servicing aprons can become completely satisfactory.

Nevitt's challenge, i.e., design to provide required strength, is a primary requirement. The other two aspects primarily concerned with jet plane operation are:

(a) A surface seal immune to the solvent action of jet fuel on asphalt pavement.

(b) A surface seal that will be almost totally resistant to the blast heat action of jets on asphalt pavement.

It is true that (a) above is concerned almost altogether with parking and servicing aprons, and (b) with starting, taxi-ing and take-off areas on runways.

Item (b) is particularly applicable for jet planes which have any angle of incidence between the line of direction of exhaust and the pavement surface.

Apparently considerable additional research is required before the three phases of the challenge that exists for the satisfactory use of all asphaltic pavement for air fields by the types of planes now in use can be solved.

Joel I. McGregor
Waco, Texas

To the Editor:

I appreciated the remarks made by Mr. Joel McGregor and wish to comment briefly on them.

I certainly agree that the two problems he mentions are basic and merit careful attention. And modern technology can perhaps make some real contributions to them. However, I do not think they rate in importance with the problem of correct fundamental design that was the basis of my remarks entitled "The Challenge." These surfacing problems are confined exclusively to airports—primarily, in a serious way to those utilizing jet planes—and while important are not quite as widespread in their implications as this matter of basic design.

● *Wherever we build* pavements, whether for airports, for highways, or other utilizations, we will be confronted by the need to improve our design approach, provided the loads are at all heavy. In brief, rational design appears as a challenge to bituminous technology wherever modern traffic, be it vehicular or airborne, is a factor.

Consequently, I felt that this point should be the subject of my article. Furthermore, I think it should receive practically undivided attention until the present concentration on the detailed application of empirical methods which do not meet basic requirements is diverted to the development of a new and fundamentally sound approach.

I would like to make a few remarks concerning the two problems mentioned by Mr. McGregor; namely, of fuel spillage and jet blast. These comments are based on experience in this particular phase of bituminous work which is quite limited but has developed some rather strong opinions on the subject. Perhaps these views will be shown unjustified by the more thorough and careful investigations of those concentrating on these matters, but the writer must receive rather convincing evidence that such is the case before abandoning them.

Essentially, our feeling is that neither of these problems should be anywhere near as serious as has been pictured, *provided* the design meets the requirements of a truly rational engineering approach. We wish to emphasize the italics of the proviso; the statement is not correct without them. It is our firm conviction that both fuel spillage and jet blast damage can be minimized to such a degree that they will no longer appear as serious problems.

This statement does not mean that attention to surfaces exposed to these two hazards in concentrated form is not required. Unquestionably some extra maintenance will be needed with the best design to occasionally correct defects that have arisen due to these agencies. However, bituminous surfaces, like all others, need maintenance in any event; and in the writer's opinion the additional cost of such extra maintenance should be normally far less than the cost of special sealing or other approaches (including the use of a much more expensive type pavement) that have been proposed.

As we see it these problems are essentially a matter of economics. A design which presents such a tight surface as well as such a strong mixture that appreciable damage from neither spillage nor jet blast occurs probably involves extra cost in addition to sound engineering. In many cases where much damage has been reported, the truth of the matter was that the design was sufficient to carry structural load but was lacking from the standpoint of an optimum mixture for resistance to these other agencies.

● *Occasionally, such* sound design will require somewhat special and different materials—primarily better or better graded aggregates—in order to obtain good results; but usually it is simply a matter of providing a really tight yet stable surface. When the extra expense of this plus some extra maintenance is brought into the picture and compared to the cost of special sealings or other types of surfaces, it is believed the comparison will be strongly in favor of the former. In brief, good engineering, though involving special studies (and sometimes better aggregate) is usually all that is necessary.

Mr. McGregor's comments were appreciated. These problems will disappear when enough men give the subject similar attention.

—H. G. Nevitt

● Placing and rolling mix, the roller being operated up and down the slope by the hoist of a crane.

Another Reservoir Lining Job Done With Standard Equipment

WHILE placing asphalt surfacing on the sloping sides of a reservoir is not new, such jobs come along only occasionally and just how the work is done is always of interest.

A recent example was the completion of a 110 million gallon reservoir in La Mesa, a suburb of San Diego, Calif. Here the novel reservoir design consisted of hollowing out the top of a small hill and then simply lining it with a 3" thickness of asphaltic concrete.

The surfaces involved were on a 3-to-1 slope, extending about 80 ft. The 1000 x 850 x 25 ft. reservoir required 18,000 tons of hot mix.

As pictured here, the contractor who placed the material, Kenneth H. Golden Co., Inc., of San Diego, used ordinary road building equipment for the work. Asphaltic mix was dumped along the top of the slope and bleeded down slope by motor graders. A 5-ton tandem roller for initial compaction and an 8-ton finish roller were both operated by means of winches which drew them up and down, the engine mechanism on the rollers being used only to supply power for steering.

● *No mechanical finishing* was involved in this job, which was completed in 20 working days.

The work was done under a $650,000 prime contract held by Rogers Construction Co., also of San Diego. The lining was not designed to provide a completely waterproof barrier. Rather, its principal function will be to provide a smooth interior surface that will simplify periodic cleaning.

The job was built by the Helix Irrigation District, G. C. Watters, chief engineer, R. H. Wilken, project engineer and Tom V. Venator, project inspector.

Los Angeles Acquires Pavers

The City of Los Angeles, as a result of an on-the-job paving test, has purchased and will soon put into service two Blaw-Knox PF-90 paver finishers. The machines will be used for city street resurfacing.

During the course of the test conducted by city street engineers, the PF-90 laid 300 tons of material on a section of Mission Road. The machine demonstrated was a 1956 model owned by the Madonna Construction Company of San Luis Obispo, California.

Several factors contributed to the city's decision. One feature was the unit's ability to go over manhole covers, which were up to three inches higher than the road surface, without incurring a variation in the thickness of mat being laid.

● Another view during the initial operation. Note assistance by a hand raker and shoveler.

Goodyear Acquires "Rubarite"

Patents and trade marks for a rubber-mineral powder, widely used for highway and industrial purposes and sold under the name "Rubarite," have been acquired by The Goodyear Tire & Rubber Company. For production and merchandising purposes, Goodyear has established a Rubarite manufacture and sales department.

A new line of products will be offered for use as additives in improving the qualities of asphalt and tar for roadbuilding and miscellaneous industrial applications such as roofing materials, pipe coatings, joint sealers, adhesives and other industrial products.

These improved bitumen rubberizing materials, containing 40 per cent by weight of unvulcanized synthetic rubber, have dispersion and suspension qualities in asphalt and tar to assure improvement in toughness, ductility, flexibility, adhesion and minimum temperature sensitivity.

The new products will be manufactured under the administration of Goodyear's research division and the direction of H. A. Endres, manager of rubber and plastics research. Col. Walter F. Winters, formerly chief engineer of Rubarite, Inc., has been retained as consulting engineer and will report to Endres. Rubarite, Inc., formerly owned by Goodyear in partnership with two other companies, was recently reorganized and is now owned by the National Lead Company.

In his new post with Goodyear, Winters will be concerned chiefly with promotion of Rubarite products in bituminous construction.

Company Buys Asphalt Plants

The firm, Industrial Asphalt of Los Angeles, said to be one of the nation's largest manufacturers of asphalt paving mix, recently purchased four asphalt plants from another contractor, Schroeder & Company, for a reported purchase price of $300,000.

Wyoming Governor Vetoes Utility Reimbursement

Governor Simpson of Wyoming has vetoed a bill which would have made it mandatory that the highway department pay for relocation of utility lines and poles and other facilities when relocation is necessitated by highway improvement. In vetoing the bill—the first to have received legislative approval so far this year—the governor said, "the bill would have a disastrous economic effect" by depleting highway funds so that they would "have to be made up by placing additional taxes on highway users by the 1959 Wyoming legislature."

The governor also said that it is unfair to highway users to employ the funds collected from them to subsidize utility companies, and that the utilities already benefit from using public rights-of-way for which no charge is made. He added that the utility companies' cost of maintaining their lines is greatly reduced by the state's highway maintenance. The utility company has its right-of-way free and clear of snow or other obstructions, and its lines are thereby easily accessible to make necessary repairs, he explained.

Relocation costs for the Interstate construction program in Wyoming, the governor said, had been estimated in excess of $12 million—which would mean a loss of construction of 69.5 miles of highway for the state.

● PERFORMANCE OF BITUMINOUS SURFACING. Bulletin 154, Highway Research Board, 2101 Constitution Ave., Washington, D. C. Contains two papers: (1) Field and laboratory investigations on hot-mix asphaltic concrete by John W. Shupe and Delos C. Taylor; (2) Records study of bituminous concrete and sand asphalt in North Carolina by A. Duke Morgan.

Construction Superintendent Wanted

Superintendent for Engineering type construction such as pumping stations, sewage and water treatment plants and flood control work. Steady employment for aggressive qualified man. Prefer man with engineering background. Send complete details on background and education. Only those well qualified need apply. Must be willing to move around southern states at job completion.

Write Box 1187, Roads & Streets, 22 W. Maple St., Chicago 10, Ill.

YES! YOU CAN BUY DIRECT NEW ROTARY SWEEPER CORES

WE MANUFACTURE ALL SIZES

- Detroit-Harvester
- Ferguson
- Grace (3 types)
- Hough
- Huber
- Lull
- Littleford
- Little Giant
- Mell (M-B) Blumberg
- Rosco
- Spearswell

(and others)

With or Without Fibres—1 to 2 Day Service!

Also peckerwood steel or fibre drag levelers Push brooms - cocoa mats, etc. - Name yours

WE SHIP WORLDWIDE

VAN BRUSH MFG. CO., INC.

Dept. F.

327 SO. WEST BLVD. KANSAS CITY, MO.

Since 1928

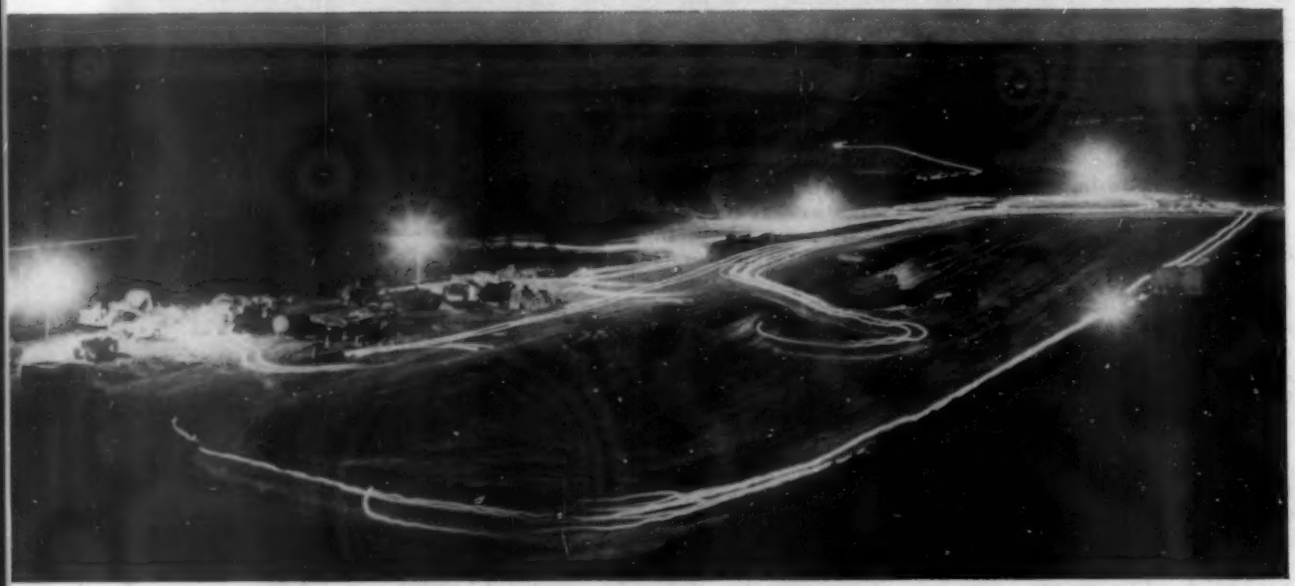
For more details circle 380 on enclosed return postal card

● **Highway contractors and material supplies are eyeing this double-dump body set which gives a legal payload in Utah of 51,470 lb. Each Alcoa aluminum body weighs about 1,400 lb. Eighteen forged disc aluminum wheels save 720 lb. of dead weight in the combination, used to move uranium ore 120 miles on-and-off-highway.**

Three reasons why

Contractors on Air Force Academy Project use STANDARD fuels and lubricating oils

Lubrication specifications are reviewed by A. R. Gaunt (left), general superintendent of Long Construction, and Standard Oil man, Ralph Dunn. Helping contractors with lubrication is a job for which Ralph Dunn is well suited. He has been doing such work for 12 years. Ralph is a graduate of Colorado State College and Standard's Sales Engineering School.



Night shift. $715,000 worth of Paul Hooper, Inc., equipment moved 4.5 million cubic yards of dirt at the rate of 25,000 cubic yards every day. Leveling site for building area included fills of up to 100 feet.

Here are three reasons why prime and sub-contractors on the $128 million Air Force Academy project, near Colorado Springs, use STANDARD gasolines and diesel fuels; STANOLUBE S-1 Motor Oil and other lubricants. (1) To serve contractors, Standard Oil maintains storage facilities for 82,000 gallons of petroleum products at the construction site. Standard men deliver to contractor's facilities directly from this installation. There's no time lost waiting for deliveries on this job. (2) Technical service on fuel and lubricants is provided contractors by experienced, qualified Standard Oil men. (3) When they buy from Standard, contractors know they are getting top quality products.

Men and machines moved seven million yards of dirt on this 17-square-mile site during 1956. Grading, utilities, arterial roads, sewer lines, water mains, portable water reservoirs and utility buildings are well on the way to completion. This is the sort of big construction that requires the "big" service Standard Oil gives contractor customers. Maybe you would like service such as this on your job. You can get it anywhere in the 15 Midwest and Rocky Mountain states. Call your nearest Standard Office, or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Paul Hooper Construction, Inc., has experienced no mechanical failures on job due to lubrication. J. L. Phillips, general superintendent, talks over lubrication with Standard's Ralph Dunn.

. for more details circle 343 on enclosed return postal card

STANDARD

STANDARD OIL COMPANY
(Indiana)

here . . . without a doubt . . . is the most useful buying catalog in your office

. . . and here are some reasons why you should be USING IT DAILY!

- Catalogs are PREFILED — Saving you time and space required to file individual manufacturers' catalogs.
- Saves you the time and inconvenience of writing to manufacturers for catalogs.
- Gives you all the facts needed BEFORE you make a buying decision.
- Manufacturers' names and trade names indexed alphabetically for quick reference to individual catalogs.
- All the buying information is 'boiled down' — designed for your convenience.

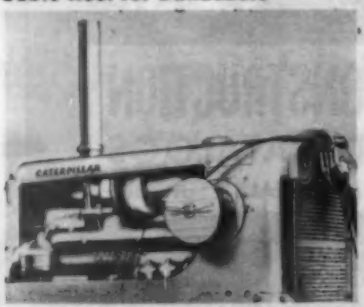
After checking the advantages listed above, you can see why this ONE CATALOG offers you so MANY advantages . . . saving you both time and money, not only in the mechanical and physical aspects of a cataloging operation . . . BUT MOST IMPORTANT OF ALL . . . it is available WHEN you NEED it . . . BEFORE you make your buying decisions! The manufacturers represented in this catalog are literally 'meeting' with you in your office — offering you all the information you could possibly need concerning their products. Why not meet them at least half way — and USE THEIR PREFILED INFORMATION!

Here are the manufacturers represented in Gillette's Heavy Construction Prefiled Catalog:

Acker Drill Company, Inc.
American-Marietta Company
American Steel & Wire
Anthony Company
Armco Drainage & Metal Products, Inc.
Arrow Manufacturing Company
Austin-Western
Baldwin-Lima-Hamilton Corp.
Barber-Greene Company
Blaw-Knox Company
Briscoe Manufacturers of California
Bros Boiler & Mfg. Company, Wm.
Buffalo-Springfield Roller Company
Butler Bin Company
Carey Manufacturing Company, The Philip
Childers Manufacturing Company, Inc.
Chrysler Corporation
Clark Equipment Company
Cleaver-Brooks Company
Cleveland Formgrader Company, The
Cleveland Trencher Company, The
Colorado Fuel and Iron Corp., The
Concrete Sawing Equipment, Inc.
Construction Products Sales
Continental Motors Corporation
Cummer & Son Co., The F. D.
Cummins Engine Company, Inc.
Detroit Diesel Engine Division
Dart Manufacturing & Sales Co.
Erie Strayer Company
Flexible Road Joint Machine Company, The
Flintkote Company, The
Gar-Bro Manufacturing Company
General Motors Corporation
Gledhill Road Machinery Company, The
Goodall Rubber Company
Gunderson-Taylor Machinery Company
Harnischfeger
Heil Company, The
Heltzel Steel Form & Iron Company, The
Hensley Equipment Company, Inc.
Hough Co., The Frank G.
Huber Warco Company
Ingersoll-Rand
International Harvester Company
Jackson Vibrators, Inc.
Joy Manufacturing Company
Madsen Works
Mid-Western Industries, Inc.
Miller Tilt-Top Trailer Company
Minneapolis-Moline
Naugatuck Chemical
Owen Bucket Company, The
Pacific Car and Foundry Company
Phoenix Products Company
Pioneer Engineering Works, Inc.
Pippin Construction Equipment, Inc.
Presstite-Keystone Company
Republic Steel Corporation
Rogers Brothers Corporation
Seaman-Andwall Corporation
Seaman-Gunnison Corporation
Servicised Products Corporation
Shawnee Manufacturing Company, Inc.
Stow Manufacturing Company
Symons Clamp & Mfg. Company
Timken Roller Bearing Company, The
Toncan Culvert Manufacturers Association
Tampo Manufacturing Company
United States Motors Corporation
United States Rubber Company
United States Steel
United Steel Fabricators, Inc.
Viber Company
Waukesha Motor Company
White Instrument Company, David
Wickwire Spencer Steel Division
Wico Electric Company
Williams Form Engineering Corporation

New Products

Cable Reel for Bulldozers



Caterpillar Cable Reel

To provide a reserve supply of cable in operating the Caterpillar Nos. 9A, 9S, 8A, 8S, and 8U Bulldozers, a new cable reel has been announced by Caterpillar Tractor Co., Peoria, Ill. Designed to mount on the side of the radiator guard, the cable reel provides storage space for 300 ft. of cable. Should cable breakage occur, the reserve cable may be readily reeved through the cable sheaves to replace the broken portion. Use of the cable reel eliminates the necessity of discarding the full length of cable required to operate the bulldozer.

For more details circle 137 on Enclosed Return Postal Card.

Removable Gooseneck Trailer

A new heavy duty low bed trailer with removable gooseneck, claimed to make it easy for one man to load or unload heavy construction equipment quickly and easily off the front end in busy, congested areas, has been announced by the LaCrosse Trailer Corp., LaCrosse, Wis.

The company has completely eliminated the complicated hydraulic or cable lifts ordinarily used on removable gooseneck trailers. Instead, the trailer bed is raised and lowered by means of a ramp mounted on the rear of the tractor. Two standard fifth-wheel couplings—one on the tractor and one on the front deck of the trailer—are used to attach the gooseneck to trailer and tractor.

For unloading, front of the trailer is lowered directly to the ground (only 16 in. loading height), by releasing the tractor fifth-wheel and slowly driving tractor forward. Two hinged gooseneck stirrups are then raised and tractor is again backed under gooseneck. Tractor king pin is relocked and after trailer king pin has been released, tractor and gooseneck are driven forward so equipment can be reloaded off front-end of trailer. The reverse procedure is followed after trailer is reloaded.

The new LaCrosse removable gooseneck trailers are available in 25 to 50 ton capacities, with tandem walking-beam or spring-mounted running gear, and up to 75 ton capacity with the new LaCrosse triple-axle design.

For more details circle 138 on Enclosed Return Postal Card.

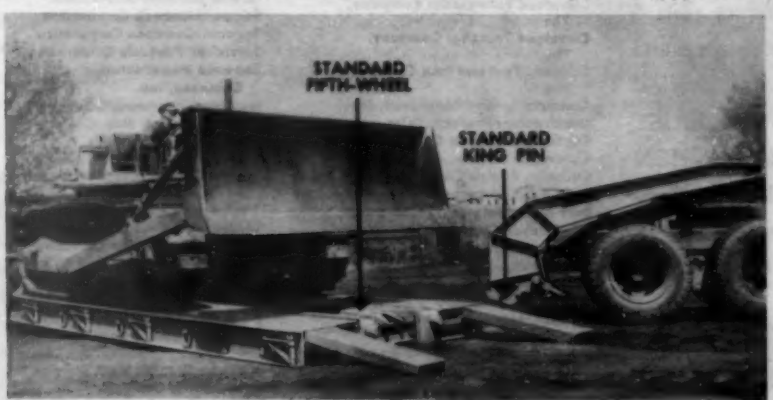
New Bulldozer for Oliver Tractor

OC-18 with New Bulldozer

The big crawler, the 135 drawbar horsepower OC-18 of the Oliver Corp., 400 W. Madison St., Chicago 6, Ill., is now available with a new engine-frame mounted bulldozer. A strong, simple hookup arrangement is used to anchor the hydraulic cylinders to the engine frame on both sides. Heavy box-section push pivot on the track frame and has far-back mounting point for greater blade lift above ground—47¾ in.

The dozer blade has a drop below ground of 14¼ in. for an overall blade travel of 62 in. Blade action is fast with a four-second lift time. The 10 ft., 10 in. wide blade has reversible cutting edge and end bits and can adjust to 14½ in. maximum tilt. Overall length of the OC-18 with blade straight is 17 ft., 11 in.

For more details circle 139 on Enclosed Return Postal Card.



LaCrosse Gooseneck Trailer

Henry Backhoe on Tractor

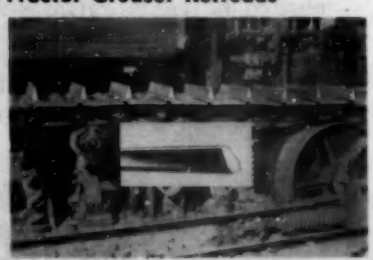
International Tractor with Henry Backhoe

International Harvester Co. has approved the method of mounting and using the Henry Super C-10H backhoe on the company's light-duty International 130 industrial tractor.

Hydraulic power for double-acting cylinders is furnished by a heavy-duty industrial-type pto pump which mounts on either front or rear of tractor. The backhoe can dig 10-ft. deep with a maximum reach of 15½-ft. at ground level; load at heights up to 8½-ft.; and swing in a continuous arc of 160 degrees, digging or dumping at any point along the arc.

For more details circle 140 on Enclosed Return Postal Card.

Tractor Grouser Retreads



Bulldog Tractor Grip-Lug

A new complete line of tractor grouser retreads for rebuilding the grouser shoes of track-laying or crawler-type equipment has been announced by Allied Steel & Tractor Products, Inc., 7835 Broadway, Cleveland 5, Ohio. It is stated that by using Bulldog tractor grip-lugs, equipment can be relugged without dismantling—saving hours of down-time and labor.

According to the manufacturer, Bulldog tractor grip-lugs have a specially designed shape, with an engineered groove and bevel, that permits welding application much faster and cheaper than using original parts.

For more details circle 141 on Enclosed Return Postal Card.

Vibratory Soil Compactor

Vibro-Plus Compactor

A new Terrapac model CK10 vibratory soil compactor, announced by Vibro-Plus Products, Inc., Stanhope, N.J., was developed to provide the contractor with a low-cost compactor which still retains high production capacity. Weighing only 1½ tons, it is stated to produce a 5-ton impact due to a unique combination of vibratory frequency (2400 VPM) and high amplitude. Heavy-duty, dustproof bearings insure the contractor against maintenance problems arising in the field. Special shock absorbers isolate the drum from the frame so that no destructive vibration is transmitted to the gasoline engine or battery. The CK 10 is highly maneuverable—may be towed by the smallest rubber-tired tractor to within 1½ in. of walls, abutments, etc.

For more details circle 148 on Enclosed Return Postal Card.

Extensible Platform for Medium Height Work

A new extensible personnel platform, announced by Mobile Aerial Towers, Inc., 1749 N. Harrison St., Fort Wayne, Ind., is being offered complete with hydraulic chain saws and pruning tools where users require these power accessories.

Designed specifically for medium height municipal maintenance work, the Hi-Ranger model 4-40CH may be mounted on most commercial vehicles, depending upon user requirements and specifications. Equipped with new Hi-Lift type adjustable outriggers, the Hi-Ranger is suitable for use on flat or rough terrain.

Hi-Ranger Platform

The 4-40CH is hydraulically actuated and controlled, deriving operating pressures from its accumulator type system, driven by the carrying vehicle's engine.

For more details circle 149 on Enclosed Return Postal Card.

Heavy-Duty Truck Rear Axle

Two new heavy-duty truck rear axles, designed and developed over the past several years by International Harvester Co., 180 N. Michigna Ave., Chicago, 1, Ill., are now in production for International A-184, AC-184, AC-1890, 190 and 200 series trucks, equipped with 6-cyl. and V-8 gasoline and LPG, and diesel engines. This new line of single reduction axles consists of the RA-44 axle with 18,500 lb. rating and the RA-46 with 21,500 lb. rating.

International Harvester designed the RA-44 and RA-46 for the heavy gross weights associated with tractor-trailer operations and the severe operating conditions of off-highway applications using modern heavy-duty truck engines. The two axles both use hypoid ring gear and pinion assemblies. Ratio spread (5.375, 6.142, 6.571 and 7.166 to 1) is arranged for compatibility with eight-speed and ten-speed transmissions.

More information can be gained from the office of International Harvester.

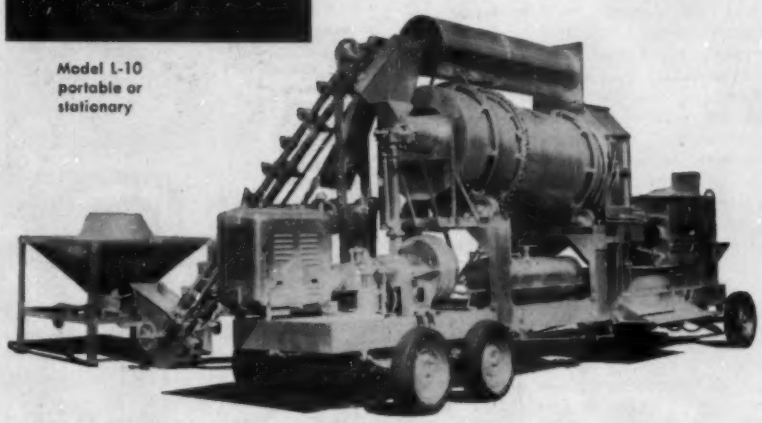
For more details circle 150 on Enclosed Return Postal Card.

White

NEW ASPHALT PLANT

$13,500 (f.o.b. factory)

Model L-10 portable or stationary



20 tons per hour hot mix capacity

Batch type 1000 lb. pug mixer with air-controlled gates. Has built-in asphalt heating kettle, reciprocating plate aggregate feeder. 50 hp engine or 30 hp electric motor. Write for catalog and name of nearest dealer. White Manufacturing Company, Elkhart 2, Indiana.

ONE MAN LOADS . . . ONE MAN OPERATES!

. . . for more details circle 365 on enclosed return postal card

SWENSON SPREADERS
FOR ICE CONTROL

SPREADS SALT 200 LBS. PER MILE OR IN ANY DESIRED AMOUNT
Lays a Narrow Strip or Full Traffic Lane

Handles all granular materials — salt, cinders, sand, calcium chloride, rock chips. Spreads at speeds up to 30 M.P.H. Clutch-controlled flow: steady or intermittent for hills and intersections.

Write for complete information

SWENSON SPREADER & MFG. CO.
LINDENWOOD, ILLINOIS

. . . for more details circle 345 on enclosed return postal card

Vibrator Has Two Moving Parts

Vibro-Plus Vibrator

A new pneumatic concrete vibrator, announced by Vibro-Plus Products, Inc., Stanhope, N. J., consists of only two moving parts. A built-in pneumatically driven vibrating element eliminates the need for separate air motor, transmission and bearings.

The AP line consists of three head sizes, ranging from 2⅜ in. up to 3 in. The double-wall rubber hose connected to the vibrator tube is made of heavily reinforced, durable, oil resistant material. It is designed not only to maneuver the vibrator but also to serve as the intake and exhaust for compressed air. Both vibrating tube and element are made of high-grade steel. An oil lubricator and ½-in. shut-off valve are standard. Lubrication is automatic—add oil to the lubricator after 8 hours operation.

For more details circle 140 on Enclosed Return Postal Card.

Gives Better Control of Striping

A new device for intermittent marking of streets and roads is reportedly proving highly successful in tests. Heretofore, retracing existing intermittent lines and adjusting cycles in transit have been vexing problems to the traffic engineer and maintenance man. This device, the SL46 Skipliner developed by Wald Industries, Inc., is specially designed for such work.

The mechanism involves an intricate epicyclic gear train with a mechanical interlock, assembled in a sealed unit. By manipulating the controls it is possible for the operator to stop the cycle, return the cycle to zero or starting position, advance or retard the cycle indefinitely for exact registration over old lines. It is also possible for the operator to change from a skip to a solid line on curves and return to the skip sequence after the curve has been navigated, by the movement of the same control lever that stops and resets the unit to starting position.

On the Northeast Extension of the Pennsylvania Turnpike, and on the Massachusetts Turnpike, operators have registered and precisely controlled the "on" and "off" cycles using this equipment. Similar results are reported by the Texas highway department. The U.S. Air Force also has used test units on runways.

The unit can be adapted for larger self-propelled stripers.

For more details circle 141 on Enclosed Return Postal Card.

New Lined Apron Feeders

A newly re-designed line of apron feeders, including more than 50 types and sizes of unit feeders and 2 sizes of portable apron feeders, has been announced by Pioneer Engineering, division of Poor and Company., Inc., 3200 Como Avenue, Minneapolis 14, Minn.

Designed to do specific jobs, Pioneer apron feeders are stated to be available in a type size to meet every job application, the type being derived by choice of drive and by choice of sideboards and hopper, and the size being determined by how the feeder is to be used.

The basic unit feeder is furnished to include one of three standard drives; (1) driven from feeder-mounted electric motor through torque-arm reducer or from gearmotor or motor reducer; (2) driven from conveyor tailshaft; or (3) driven from crusher shaft or countershaft. Straight sideboards, flared

Pioneer Apron Feeder

sideboards or hopper may be added to the basic feeder regardless of type of drive.

Unit feeders are available with standard pan widths of 30 in., 36 in., 42 in. and 48 in. and in standard lengths of 4-ft., 6-ft., 8-ft., 10-ft. and 12-ft. nominal center to center distance between headshaft and tailshaft).

For more details circle 142 on Enclosed Return Postal Card.

Improvements on Power Truck

Prime Mover Power Truck

Addition of optional equipment to its model M30 power truck for improved performance in mud or soft fill has been announced by the Prime Mover Company, Muscatine, Iowa.

A Powr-Lok no-spin differential is offered for maximum power delivery on unstable surfaces, along with dual drive wheels on heavy grip lug tread for extra traction.

The Powr-Lok differential delivers the major portion of engine power to the driving wheel with the better traction. It is stated, if one drive wheel goes off a runway onto soft fill, driving force is directed to the other wheel which has sure traction.

For more details circle 143 on Enclosed Return Postal Card.

Rotary Portable Compressors

Gardner-Denver Compressor

Two new models, the RP125 and RP365, have been added to the line of Gardner-Denver Co., Quincy, Ill.

The model RP125 is available with either gasoline or diesel engine. It is 10 ft. 6 in. long (from the end of the stationary tow bar to the back of the compressor), 4 ft. 8 in. wide and 5 ft. high.

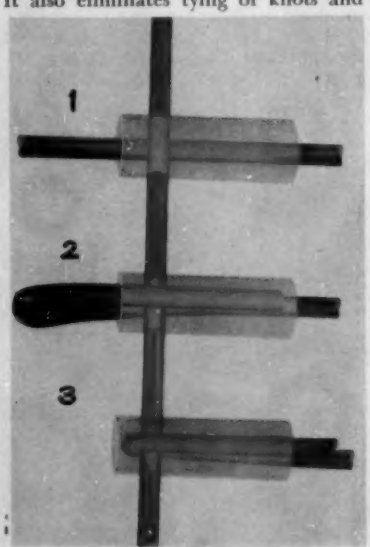
The model RP365 is equipped with a diesel engine as standard equipment. It is 10 ft. long (with movable tow bar in vertical position), 5 ft. 7 in. wide, 6 ft. 5 in. high and has a net weight of 7730 lb.

For more details circle 144 on Enclosed Return Postal Card.

Plastic Connector for Fuse

A plastic connector that is reputed to provide a simple but completely effective method of hooking up detonating fuse preparatory to blasting has been announced by Austin Powder Co., Cleveland 15, Ohio.

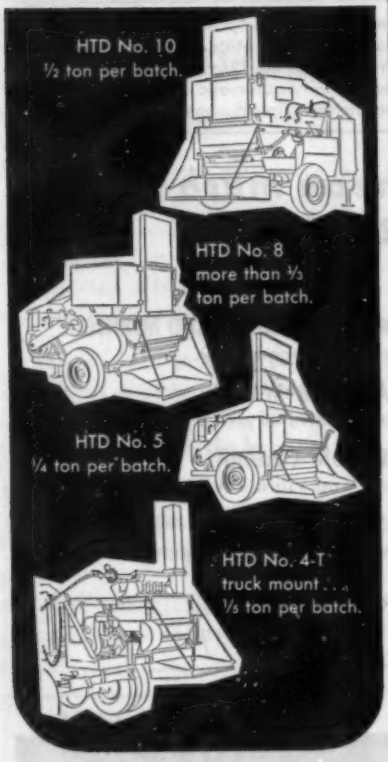
When employed for joining trunk and branch lines, the new connector is said to assure a positive coupling that won't slip, loosen or lose contact in any weather or under any job condition. It also eliminates tying of knots and



Austin Fuse Connector

FOR LOW-COST HOT OR COLD PAVING OR PATCHING IN ANY SEASON

McConnaughay ASPHALT MIXERS



For details and specifications write . . .

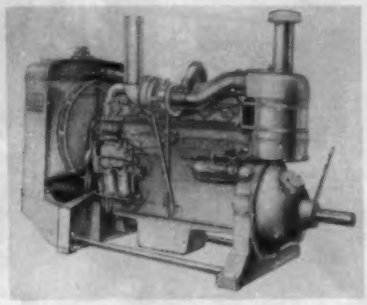
McCONNAUGHAY MIXERS, INC.
LAFAYETTE, INDIANA
National distributors: Asphalt Equipment Co.
3314 Cherry Lane, Fort Wayne, Indiana

the resultant possibility of their becoming untied.

According to the manufacturer, detonating fuse is fastened in the connector in an easy 3-step operation. First, the fuse from the shot hole is threaded through the length of the connector. Then, the trunk line is pressed into the grooved slots. Finally, the branch line is passed over the trunk line, returned the length of the connector and pulled tight.

For more details circle 145 on Enclosed Return Postal Card.

250 Hp Turbocharged Power Unit



Turbotorque Power Unit

The International Harvester Co., Construction Equipment division, Melrose Park, Ill., has entered the turbocharged engine field with its new 250 hp Turbotorque UDT-1091 power unit.

This 250 brake horsepower rating is attained at 1500 rpm, an increase of 50 hp over its naturally-aspirated counterpart, the UD-1091, previous top-hp unit in the International line of 18 power units.

Its exhaust gas-drive AiResearch turbocharger moves 60% more air through the 14-in. diameter air cleaner. This boost in air supply to the cylinders is stated to result in an economy-saving cut in fuel consumption and higher power with lower exhaust gas temperatures.

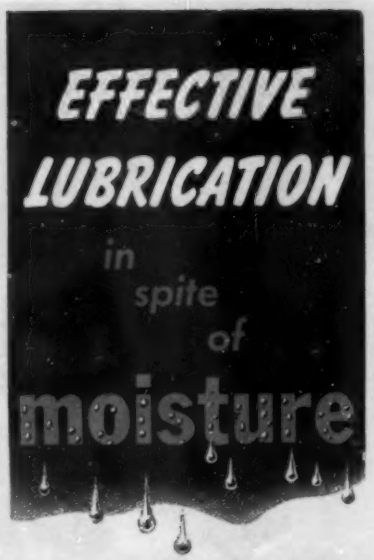
A water-cooled oil temperature stabilizer is standard equipment on the new unit. The radiator has been enlarged to increase cooling capacity.

For more details circle 146 on Enclosed Return Postal Card.

Platform Type Dump Bodies

Completely new series 806, 960, and 1060 platform dump bodies have been announced by Daybrook Hydraulic division, L. A. Young Spring & Wire Corp., Bowling Green, Ohio. In all, 20 models are available in platform lengths ranging from 8 ft. to 16 ft. and a standard width of 95½ in. All bodies have a reinforced heavy-duty understructure that provides exceptional rigidity and strength. Both smooth and non-skid type platforms are available; also, stake pockets are provided as standard design.

For more details circle 147 on Enclosed Return Postal Card.

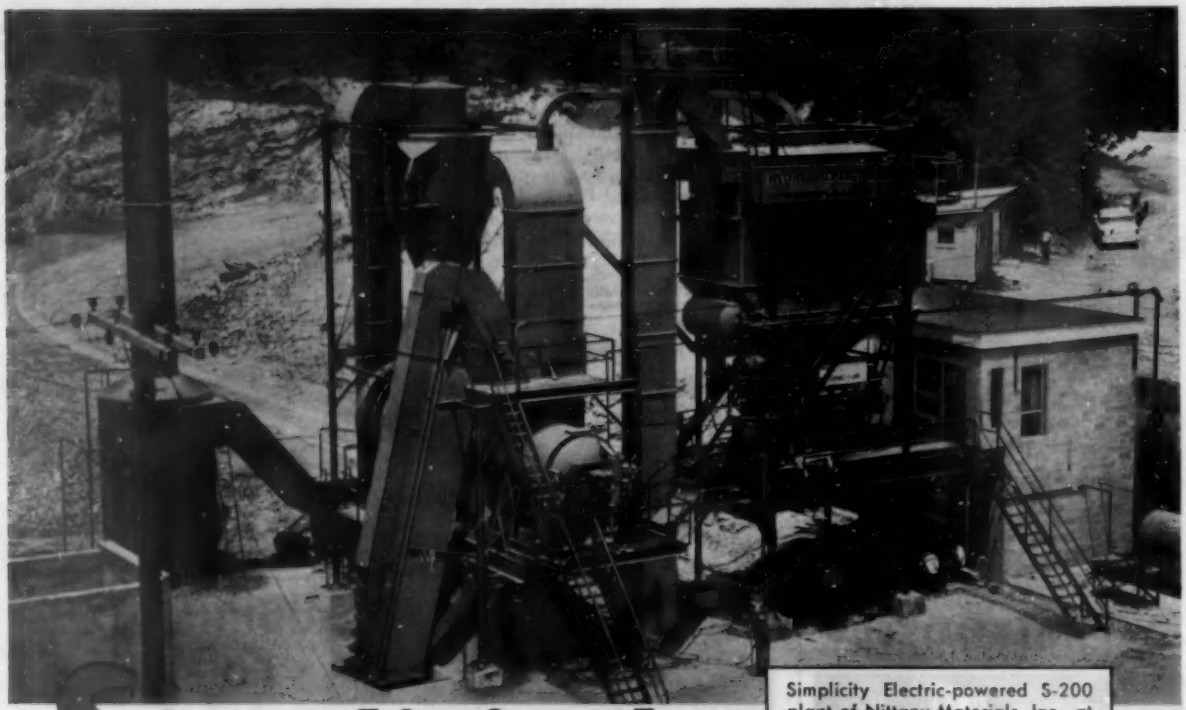


LUBRIPLATE 130-AA

affords machine parts and bearings real protection against rust and corrosion. It is a grease type lubricant that possesses the utmost in water and acid resistance. It has exceedingly high film strength. Due to the marked adhesiveness and water resistance of LUBRIPLATE 130-AA, it does not wash off readily, hence is the ideal lubricant in the presence of moisture.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. LUBRIPLATE DIVISION, Fiske Brothers Refining Company, Newark 5, N. J. or Toledo 5, Ohio.



Simplicity Electric-powered S-200 plant of Nittany Materials, Inc., at Stroudsburg, Pa. One man operation by fully automatic controls in the air-conditioned room at right.

Simplicity's

basically different design can mean much to you in the Road Building "Rat Race".

Here are some of the basic differences in Simplicity asphalt plants:

- **DOUBLE SHELL DRYER**
  Dependable, Durable and Economical.
- **HOT OR COLD MIX**
  Two Furnaces on One Double Shell Dryer.
- **DOUBLE ZONE MIXER**
  Faster and More Thorough Mixing.
- **FOUR TON MIXER**
  Properly Designed, Not An Overloaded 3-Ton.
- **FULLY AUTOMATIC BATCHING AND MIXING**
  Faster, Accurate, Dependable.
- **ASPHALT PLANT AIR WASHER**
  Protects Men, Machinery and Neighbors.
- **TUBULAR ERECTION COLUMNS**
  Erection Time and Vibration Reduced.
- **HOT SPOT ASPHALT TANK**
  Asphalt **Hot**—Quicker and Cheaper.

- ***Lowest price, highest quality—sales price below 50c per pound.***

THERE'S A SIMPLICITY PLANT NEAR YOU

On request, we'll be glad to send you the name and location of a nearby installation.

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THE SIMPLICITY SYSTEM

FROM BUILDER TO BUYER
BETWEEN MEN WHO KNOW

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. . . for more details circle 340 on enclosed return postal card

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- Permanent employment for qualified men
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Excellent advancement opportunities in a long established and progressive consulting firm, for engineers experienced in the design of highways and bridges. Location of assignment in attractive and modern air conditioned home offices.

Interesting and challenging permanent assignments. Attractive salaries and liberal employee benefits, including free use of swimming pool and golf club for employees and families.

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DESIGNERS DRAFTSMEN

Positions open for qualified men in highway structures and related work. Extensive program. Excellent working conditions and many employee benefits.

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Salesman for Replacement Tractor Parts with experience and following among road builders.
Protected Territory.
Good opportunity for producer on commission basis.

Box 500 Roads & Streets
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ENGINEERS — FOREMEN — OFFICE MEN
Learn latest methods to organize and run work. Prepare for the top jobs. Send post card for details.

GEO. E. DEATHERAGE & SON
CONSTRUCTION CONSULTANTS
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LOW-BOY TRAILERS

60 Ton Rogers tandem axle drop deck, outriggers, air brakes, 1949 model tandem gooseneck, 16 tires and in excellent condition.

30 Ton ROGERS 16 tire tandem, level deck, outriggers, air brakes, 1952 model, perfect condition.

25 Ton ROGERS tandem axle model T25D, built 1950, 1000 x 15 tires, air brakes, drop deck, tandem gooseneck, perfect.

15 Ton ROGERS tandem axle model T15D, built 1951, 825 x 15 tires, air brakes, drop deck, gooseneck for single axle truck, like new.

10 Ton ROGERS single axle model S10L, built 1952, 900 x 15 tires, air brakes, fenders on gooseneck. Like new $1,750.00

20 Ton LaCrosse 1952 tandem axle with beavertail, vacuum brakes $2,500.00

20 Ton Johns tandem axle level deck, air brakes $1,900.00

10 Ton Welding Shop tagalong 8' x 16' bed, $900.00.

R. WAYNE FOBES
Albion, Penna. - Phone 871

REAL BUYS

DRYERS
One 72" x 28' Madsen Portable, Gear & Pinion Transmission, 50 HP Gear Head Elec. Motor, cold feed bucket elevator.
One 82" x 23' Gear & Pinion Drive, 40 HP Elec. Motor & Speed Reducer.

AIR WASHER
Simplicity 8' Dia. 15' Hi. Complete with spray nozzles.

DUST COLLECTOR
Twin 7' Cyclones, No. 80 General Exhaust Fan rated 30,000 cfm. 75 HP Elec. Motor "V" Belt Drive. All mounted as a unit on structural frame for legal highway movement. Complete with reclaiming screw conveyor. Available also, air ducts for connecting to Madsen Dryer and/or Simplicity Air Washer

FEEDER BIN
B-G 9' x 14' Feeder Bin. 2-compartment. Equipped with B-G 813 Reciprocating Feeder. 2 HP US Varidrive Elec. Motor. Practically new.

CRANE
Link-Belt LS-90 Ser. 7 AN-1607. 40' Boom. 5' & 10' Extensions. High retractable gantry. Independent boom hoist. 30" crawlers. Mod. 646 Rudomatic tagline. Cat. D-318 Engine.

BUCKET
Kiesler Rehandling Clamshell. 1 C.Y. Ser. 702-6047 Type H

ROLLER
One Huber Tandem 8-12 Ton. Buda Gas Engine. Elec. lights & starters. Water Tanks and spray bars. Ser. T-3945

One Gallon Trench Roller. Gas Engine. Elec. starter. Hyd. Steer. Hyd. adjustable wheels. 20" compression roll. Used very little.

ASPHALT FINISHER
Barber-Greene New 1951 Good Condition. LeRoi Engine. Elec. starter, fully equipped.

OIL BURNER
40 HP Hopkins Bros. Low Pressure Air Atomizing Burner complete with fuel oil pump. New August 1956. Used only 30 days. Like new condition.

BOILER
One hi-pressure Loco. Type 95 HP—175# W.P. Insulated. Portable. Pneumatic tire semi-trailer running gear. Special oil-burning firebox. All fittings. Ready for operation. Underwriters inspected.

One hi-pressure Scotch Marine. 75 HP 150# W.P. Corrugated furnace. Oil-burning combustion chamber, special mounting for portability. Complete insulation. All fittings and stack. Underwriters inspected.

BOILER
One Cleaver Brooks 40 HP, 4-pass 125# W.P. Full automatic controls. Complete insulation. Skid mounted. Oil-burner. Underwriters inspected.

BOILER FEED SYSTEM
Schaub Standard Boiler Return System. Completely automatic. Used less than 10 months.

CAR MOVER
Braden Winch complete with gear shift transmission and Wisconsin Air Cooled Engine.

This equipment has been well cared for and will stand rigid inspection. Priced right for quick sale.

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SPRA-CURE CONCRETE CURING COMPOUND

Clear and white pigmented to meet all Federal and State specifications.
Usage expanding rapidly. The low labor, positive way to cure concrete.

- Priced to compete
- Distributor areas open

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FOR SALE

CRANES & SHOVELS

Bantam "M-49" ⅜ yd. Hoe, mounted Chevrolet Tandem Truck.

Insley "K-12" ½ yd. Trench Hoe, Crane or Dragline, (2).

Marion "331" ¾ yd. Shovel or Dragline.

Byers "83" Used ¾ yd. Crane or Dragline.

Link-Belt Shovel Attachment complete for LS-85 (¾ yd.)

LOADERS

Caterpillar "D-6" Diesel Tractor w/Hi-Lift Cable Traxcavator, 1950 model in fine shape.

Allis-Chalmers "HD-5G" Used Diesel Tractor w/Tractomotive Front End Loader, Rebuilt tracks and engine.

Pettibone "10" Used 1 yd. Tractor Shovel, 4-wheel drive.

Barber-Greene "545-46-3" Used Rubber-Tired Bucket Loader.

MISCELLANEOUS

Gruendler "1024" Roller Bearing Jaw Crusher.

Parsons "21" Ladder-Type Crawler-Mounted Trenching Machine, digs 9' deep.

Pettibone-Wood "820A" New Windrow Proportioner. Reduced for quick sale.

Pettibone-Wood "P620" Used Preparizer, G-M Power, Diesel. Will rent or sell.

Bayport 23 yd. New Aggregate Bins.

Rex 3 yd. Hi-Discharge Moto-Mixer (4¼ yd. Agitator) mounted I-H "L170" Tandem Axle Truck.

Jaeger 3 yd. (4¼ yd. Agitator) Hi-Discharge mixer, 1945 model, mounted on 6-wheeler. Cheap.

NOTE: This Equipment Located in our Yard

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1—D8 Cat Tractor w/angle blade & DDP Unit, S/N 2U5173	$10,000.00
1—D8 Cat Tractor w/angle blade & DDP Unit, S/N IH8690	7,000.00
1—D8 Cat Tractor w/push plate & DDP Unit S/N IH6122	7,000.00
1—D7 Cat Tractor w/push plate & DDP Unit, S/N 7M4127	5,000.00
1—Scraper, GarWood 25 cu. yd., S/N 5231	5,500.00
1—Slusser McLean Heavy Duty three tooth Ripper, S/N 271	1,000.00
1—Buffalo Springfield Roller, S/N 21936, 5-8 Ton Perfect Condition	2,500.00
1—10 Ton Buffalo Springfield Roller, S/N 18680, w/Wau. Gas engine, perfect condition	3,500.00
1—Air Compressor, Gardner-Denver 210 ft. Cat Diesel Engine	
1—Air Compressor, Worthington 105 ft. Continental Gas engine.	
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1—2 cu. yd. Omaha Dragline Bucket	700.00
1—2 cu. yd. Esco Coal Loadin Dipper—complete	2,000.00
1—4½ cu. yd. Hendrix Heavy Duty Dragline Bucket	700.00
1—Buda Herndon Earth Drill, with 18" auger, will dig 10' deep hole	1,500.00
1—New Hoe Stick for Model 255A P&H Backhoe	500.00

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Phones 145K12 or 165
Clay City, Indiana

FOR SALE

CONSTRUCTION EQUIP.

3 D8 Cats. Serial #2U8954 with #25 CC and 8A Blade $9500.
Serial #2U8734 with #25 CC and 8S Blade New Moldbord $9500.
Serial #2016235 HI OUTPUT With push plate $9000. All 3 for $23,000.

1 D7 Cat. Serial #3T24149 with #25 CC and 7A Blade Oil Clutch Price $7500.

1 D7 Cat. Serial #7M6353 With Le Tourneau CC and Angledozer. Price $3500.

1 D7 Cat. Series M With Le Tourneau CC and Cat. 7S Blade $3500.

1 Northwest 25 Shovel Front Complete Excellent $2000.

3 CT Le Tourneau Turnomatic Turnapulls. Serial #2825 Pr. $9000; Serial #2826 Pr. $9000; Serial #5005 Pr. $10,000; all for $24,000.

2 Euclid S 18 Series 27 LDT $19.00 with 27 SH Scrapers Series $9,000 New Modification Excellent $25,000. Each Both $47,500.

2 Euclid 8 TDT Series 13700 with 14 SH Scrapers Series 6800 completely Rebuilt at cost of $15,000. Each $22,000. Both $41,000.

3 DW 10 Cats. With #15 Scrapers Series 1V2600. Very Good $12,000. Each All for $34.00.

1 Lima 802 Shovel and Dragline Combination D-17000 Engine Serial #3168. 70 Ft. Boom Paige or Hendrix Bucket 32 in Extended Tracks. Excellent $31,500.

1 L80 Lorain Comb. Shovel and Dragline Series 14600 D13000 engine. $7500 spent on repairs. Excellent $22,000.

1 L50K Comb. Dragline and Camel Back Backhoe Series 23600 D318 Engine 50 Ft. Boom very good $20,000. Both L80 and L50K for $38,000.

1 DW 21 Cat. Series 8W 680 with #21 Scraper. Less than 2700 hours. Drive tires like new. Scraper tires 85%. Excellent $23,000.

1 Allis-Chalmers HD 9G Serial #745 with Tractomotive Shovel. Very Good $6,000.

1 Cat. 80 Scraper Flat Btm. Serial #5W164. Excellent. Including tires Front 1800 by 24 Rear 2100 by 29 $8,500.

1 Simplicity Asphalt Plant 50 ton per hr. Complete with Bins, Storage, Tanks, Dryer, Cummins Diesel Motor & Fruehauf Tool House Pr. $31,500.

1 Cat. 70 Scraper Serial #8C 2481. Tire Group 3F8442. Excellent $6,500.

1 Heil Scraper Model 0C16. Serial #7229. 2100-x25 Tires. Very Good $4,500.

1 Gar Wood Scraper Serial #181, Model 517. 1800x24 Tires. Very Good $4,500.

5 Model FP LeTourneau Carryall Scrapers Series 33000 to 35000. Excellent Each $3,750. All for $18,000.

1 Cat. #12 Motor Grader Series 8T 14800 Scarifer and Cab Less than 2000 hours. Excellent. Including Rubber $11,500.

1 D8 Cat. Series 2U10700 with #25 CC. Excellent $9,500.

3 Terra Cobras Series 53000. Excellent. Each $11,500. All for $32,000.

1 Parsons Trenchliner Series 2300, Model 250 $8,500. Excellent.

3 HD 20 Allis-Chalmers Pushers Series 3700 to 4700. Priced from $10,000 to $13,000. Excellent.

1 D8 Cat. Serial #2U6905 No. 25 Cable Control and 8A Blade Pr. $8,000.

1 D8 2U17884 with 25 cable control and 8A Blade Pr. $10,000. Both for $16,500.

Powell Equipment Co.

P.O. Box 186 - Phone 2952
SALISBURY, NORTH CAROLINA

FOR SALE

1947 D4 Caterpillar, 5T1 series, with LaPlant Choate Hydraulic straight blade. 16" pads, wide tread. Very good condition $3,850.00

D-4 2½-3 yd. Tournapull. Only 79 hours on motor meter, pan not used. Has been standing, but like new condition. 2,500.00

All items have been cleaned and painted and Decal-ed and look like new equipment. Will accept trade of 125 cu. ft. or larger stationary air compressor or 5 ton or larger Bridge Crane 18' or wider span (floor operated preferred).

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For Sale, Rental or Rental With Purchase Option

All equipment may be inspected on location at Rapid City, South Dakota, Beverly, Nebraska and Denver.

1—Lima 803 2½ cu. yd. shovel, Cummins power and torque converter.
1—Lima 802 2 cu. yd. shovel with 85' dragline boom and Cat engine.
1—Lorain 820 2 cu. yd. shovel with 65' dragline boom, Waukesha powered.
9—D8 Caterpillar tractor with No. 25 Cat power control units. Several 8R models, balance 2Us.
6—Caterpillar 8S dozers.
4—Caterpillar DW20's 18-23 cu. yd. capacity.
4—Woolridge Terra Cobra TC-S14 tractor scraper units, 15-18 cu. yd. capacity.
3—LeTourneau "W" scrapers, 24.00 x 32 rubber.
1—LeTourneau "F" Scraper, 18.00 x 24 rubber.
2—Fleco rock rakes, complete with arms.
4—McCoy and Gebhart sheepsfoot rollers, heavy U.S.B.R. and U.S.E.D. type.
1—Galion No. 102 Motorgrader, IHC diesel powered.
1—Caterpillar No. 12 motorgrader.
6—Euclid 36 TD 22 ton end dump trucks, with Allison retarder brakes and Torqmatic transmission, Cummins 300 h.p. engine.
3—Ingersoll-Rand 600 C.F.M. Gyroflo air compressors.
1—Gardner-Denver 365 C.F.M. air compressor, Cat powered.
8—Cleveland DR34 3" and Ingersoll-Rand 4" Wagon drills.
1—Rex 34E dual drum paver.
1—Jaeger 16S concrete mixer.
1—Aggregate batch plant, complete with 2 cu. yd. Noble weigh-batcher, 4 compartment bunker bins, Cedarapids 3 deck aggregate shaker.

Also a large assortment of rock drills, paving breakers, air tampers, portable arc welders, hand power saws, radial saws, light plants (1½ to 10 KW), half ton to one ton pickup trucks—Ford F7 and F8 dump trucks, McCoy earth manipulator bars and 1½" to 6" pumps.

Assortment of ¾ to 3 cu. yd. dragline buckets—Esco, Page and Hendrix.

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Highest dollar value paid for new and used trucks and all kinds of used equipment. All types of truck equipment bought and sold, including war surplus.

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CURRENT-FRESH NEW TIRES 1sts

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		Off-The-Road	Highway
600 x 16	(6-Ply)	$14.50	$12.50
900 x 16	(8-Ply)	39.50	35.00
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CALL COLLECT FOR ANY SIZE NOT LISTED.
25% Deposit - Balance C.O.D.

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SCRAPERS

Four No. 90 Caterpillar Scrapers, 9V Series, 21.2 cu. yd. struck. 27 cu. yd. heaped. 24:00x-29, 24 ply tires front; 27:00x33, 24 ply tires rear. Tires are between 92% and 100% of new condition. Scrapers purchased new May 1956 and are in next to new condition. Cleaned and painted.
Location: Parkersburg, W. Va. $14,000.00 each

TRACTORS

No. 307 Caterpillar D8 Tractor, 15A Series, equipped with 8A blade and 29 cable control, canopy top, lighting system. New sprocket rims, rollers rebuilt, new rails, grousers 60%. Engine in excellent condition. Cleaned and serviced and painted.
Location: Charleston, W. Va. $27,500.00
No. 345 Caterpillar D8 Tractor, 15A Series, equipped with 8A blade and 29 cable control, canopy top, lighting system. Machine in excellent operating condition. Track material excellent. Cleaned, serviced and painted.
Location: Parkersburg, W. Va. $25,000.00
No. 344 Caterpillar D8 Tractor, 15A Series, equipped with 8A blade and 29 cable control, canopy top, lighting system. New set of rollers. Machine and track material in excellent condition. Cleaned, serviced and painted.
Location: Parkersburg, W. Va. $25,000.00
No. 310 Caterpillar D8 Tractor, 13A Series, equipped with 8A blade and 25 cable control, canopy top. 3745 hours. Cable control completely rebuilt. Blade replated. Engine checked over thoroughly and found to be in excellent condition. Track material about 50%. Cleaned, serviced and painted.
Location: Charleston, W. Va. $20,000.00
No. 314 Caterpillar D8 Tractor, S/N 2U8216 equipped with 8S blade and 25 cable control. New heads in engine, reground valves, new rings and bearings. New sprockets and idlers, new bevel gear and pinion, brakes relined. Final drive bearings and seals replaced. Cleaned, serviced and painted.
Location: Parkersburg, W. Va. $16,000.00
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D8 Tractor (S/N 2U18295) No. 25 Cable Control and No. 8s Cable Bulldozer. New tracks and sprockets. Rollers and Idlers, new or rebuilt; new seals. Machine in top condition. Guaranteed. $16,500.00 F.O.B. Albany, N. Y.

D7 Tractor (3T series) No. 46 hyd. control and No. 7S hyd. bulldozer. New tracks, rollers, sprockets and idlers. Completely rebuilt. Guaranteed. $12,500.00 F.O.B. Albany, N. Y.

T. SOUTHWORTH TRACTOR & MACHINERY CO., INC.

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Albany, N. Y.

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NEW and Guaranteed REBUILT ENGINES

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1955 PETTIBONE-MULLIKEN

MODEL 125-A

1½ YARD CAPACITY

4-Wheel Drive - 2800 Hours.

New Torque Converter,

2 New Drive Clutches,

Newly Capped Tires.

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FOR RENT OR SALE

3—Gar Wood 625 Scrapers, 25-yard capacity

4—Caterpillar D-8 Tractors with Allis-Chalmers 315 Scrapers

Tractors are late serial numbers and in excellent condition. Scrapers are like new.

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¾ cubic yard, Model 416, 20 tons capacity, Front and Rear wheel drives, Hercules 6 cylinder engine in truck unit, Waukesha 6 cylinder engine in crane unit.

Excellent Running Condition

Ralph R. Brumel

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PIONEER CRUSHING & SCREENING PLANT

PIONEER Model 46VE semi-electric crushing and screening plant, SM46VE-150. New in December, 1954.

COMPLETE INCLUDING: 1036 jaw crusher, 4022 rolls, 4 x 12 3½ deck inclined screen, 50' x 30" swivel feed conveyor with pneumatic tired transports, 50' x 30" delivery conveyor with pneumatic tired transports, 30" x 18' and conveyor, General Motors 100KW electric set driven by GMC 6110 engine to drive the accessories. No engine for the jaw and rolls, but we have a used UD24 that could be put in with this.

This machine has worked only a little more than two seasons and is in excellent condition. It is now in operation and can be seen near Grand Junction, Colo.

Also bargain price on complete 100 ton per hour stationary crushing, washing, screening plant with only 400 hours work.

For complete information, write, wire, or phone collect.

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5990 Colorado Blvd. Denver, Colo.

Phone ATlas 8-0771

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Steam Pile Hammers and Extractors

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- STEEL LEADS
- DRIVING CAPS
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- HOISTS AND BOILERS

STEEL SHEET PILING

Pcs.	Section	Length	Location
94	MP-116	34 to 35 ft.	Wisconsin
101	MP-116	15 to 20 ft.	Iowa
75	MP-116	60 ft.	Chicago
110	MP-115	35 to 60 ft.	Kansas City
130	MP-116	35 to 45 ft.	Alabama
36	MP-115	60 ft.	Nebraska
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FOR SALE

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120-B Electric Shovel - Very clean.

Road Graders.

54-B Dragline - A real buy.

621 Page Dragline - Completely rebuilt.

1201 Lima - Draglines and Shovels.

SEVERAL SMALLER MACHINES

Loraine - P&H - Osgood - Link-Belt - Lima.

D-8 Dozer Hydraulic Blade - Good as new.

TD-18 Dozer - Bargain price.

Hundreds of new genuine Page Dragline Parts for 618 - 621 - 625 in Stock - 50% Saving.

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WANTED
To Turn Into Cash
Priced For Quick Sale

Barber-Greene 24"x80' Portable Conveyor S.N. 374x124, new last fall, perfect condition

Butler Concrete Batch Plant, Complete
Two V50 2-compartment aggregate bins
Cement bin and storage bin
Complete with undertrack screw, cement elevator, and twin scales. Can be converted easily to automatic operation.

2—Model C-Turnapulls Serial #GM-9T3780 -CR & G-4708—FCR-W have been used very little. Rubber fair on one—Excellent on other.

D-7 HI-LIft, S.N. 9T8441

Tri-line Concrete Saw, S.N. TL-A-105

Cleveland Form Tamper, S.N. 322X56

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ONE MAN and a MAINCO WHEEL can beat 2 MEN using CHAIN or TAPE!

MAINCO
DISTANCE MEASURING WHEEL

Send for descriptive folder.

THE MAINTENANCE CO., INC.
Dept. "D", 453 W. 42nd St., N. Y. 36, N. Y.

This pile of heavy boulders couldn't daunt the low priced Kolman Model 202 Conveyor-Screen Plant.

The built-in reciprocating plate feeder in the feeder-hopper combination protects the belt from damage and provides a constant flow of material. The 24" conveyor belt delivers the gravel containing a high percentage of oversize boulders to the 7'x42" Kolman single-deck vibrating screen equipped with a 6" square-opening screen cloth.

This Model 202, owned and operated by the Jefferson County Highway Dept., Jefferson County, Colorado, meets the demand for a low-cost conveyor stout enough to carry a large single or double-deck screen and feeder-hopper combination in a completely portable plant. They have found it takes all the punishment that is dished out to a portable plant—and costs less money to buy and operate.

The rugged "box-type" construction of the Model 202 gives unusual strength and rigidity.

Self-cleaning tail pulley, bar type head pulley, ball bearings throughout and heavy truck axles and tires are included to give it the biggest combination of fine features to be found anywhere in the low price field.

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USED EQUIPMENT

1—TD-6 1952 IHC Crawler Tractor, s/n 30548, with Bucyrus-Erie hydraulic dozer, s/n 93069.

1—TD-9 1944 IHC Crawler Tractor, s/n 18580, with Bucyrus-Erie hydraulic dozer, s/n 44089.

1—Model MA 6 to 8 yd. LeTourneau 6 wheel cable scraper.

1—Model 255A ¾ yd. P & H 35 ft. boom crawler mounted crane.

1—Model 38 Sargent Backhoe mounted on Ford F8 truck, complete with 35 ft. of crane boom.

1—Backhoe attachment for LS40 Link Belt.

1—Jeep with front mounted hydraulic Heath loader.

4—4½ yd. Jaeger truck mixers.

1—1946 model M555 Littleford 300 gallon asphalt kettle.

1—4 x 5 pull type flat rollers, concrete and water filled.

9 and 13 wheel Waico self-propelled pneumatic tired rollers, powered by Hercules gas engine.

165 cu. ft. Ingersoll Rand air compressor on 4 wheel trailer.

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MACHINERY & SUPPLY CO., INC.
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PHONE HObart 4-3321

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International TD24 with Long Track & Push Plate. Used less than 2 seasons.
Excellent Condition

SWEENEY BROTHERS TRACTOR CO.
Fargo, North Dakota

FOR SALE

MICHIGAN MOBILE TRUCK CRANE, 12 ton capacity, with 85 ft. boom and Hercules motors. A-1 condition in appearance and mechanically. Newly painted.

Price $10,500.00, f.o.b. Youngstown, Ohio, subject prior sale.

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1—16 to 18 cu. yd. Terra Cobra with Cummins Diesel Engine. Very good condition - ready to work.

1—Adnun Paver - Good condition.

1—Buckeye Chip Spreader Box.

1—30 ft. Aluminum Van Type Trailer—Like new.

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AVAILABLE IMMEDIATE SHIPMENT

380 pcs. 60 ft. Both. DP-3—New York
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McKiernan-Terry and Vulcan Pile Hammers and Extractors Boilers, Hoists, Derricks, Cranes Compressors, Railroad Equipment, Etc.

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Barber-Greene Ditchers 8'3" Boom, Serial #44-8-111. Excellent condition, ready to go, $4200.00.

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Dayton-Dowd Centrifugal Pumps
30" x 24" - 15000 GPM Rating
½ Price

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FOR SALE

LeTourneau Dozer Model Super C
Serial No. GLD4617SCM
Air Actuated
Excellent Condition

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Lima Diesel Crane. Model 602. 1½ yd. bucket and 30 ton crane capacity. 120 ft. boom, plus jib. Independent boom hoist. General Motors 174 HP diesel engine. Crawlers 16'10" long.

Price $20,000 f.o.b. car.

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1906 Railway Exchange Bldg.
St. Louis 1, Missouri

FOR SALE

Allis Chalmers Model TS200 S/N T200-2153, traction tread tires, bucket seat & cab.

Cleveland Model Trencher S/N 3446, with electric starter, air cleaner, oil filter, deep oil pan, 10" smooth crawler pads.

Allis Chalmers Model "D" Grader S/N 3399, with scarifier leaning front seat.

Bakers Model SFD 96 Sheepsfoot roller (double) S/N 237.

1953 G.M.C. 6 yd. dump truck, with 2 speed rear axle.

1949 Chev. COE, Engine #GBA 39525, with lowboy trailer.

3" Water Pump (new in 1956).

D-8 Dozer, S/N 2U19042 SP with 8A Dozer S/N 7A4584 #25DDPUC S/N 9D23144.

1950 La Plante Choate Wagon, S/N C-314-488, 12-15-C.Y. Capacity.

The above equipment is in excellent condition, and is located at Pontiac, Michigan.

For full particulars write Eugene Coe, 1754 Opdyke Rd., Pontiac, Michigan, or call FEderal 2-22965.

FOR SALE

The following equipment located in New York:

1—1955 Insley Backhoe, S/N 11061.

1—TD-14 Diesel Crawler Tractor with Side Boom, S/N 24383.

1—Hough Payloader, S/N 82197.

1—95 Cleveland Trencher, S/N 3354.

The following equipment located near Chicago

1—1955 Cleveland Trencher, Model 140 —S/N 5782.

1—Model 95 Cleveland Trencher, S/N 3509.

1—Rodgers 35 Ton Low-Boy with International Tractor - Tires 90%.

All of this equipment is in excellent shape and ready to go.

Lemont Stone & Material Co.
P. O. Box 11 - Lemont, Illinois
Phone: Chicago, Bishop 2-2075; Lemont 1130

FOR SALE

Do-Mor Elevating Grader for Cat 12 Motor Grader; Excellent condition.
Call Arnold Ruud, Sales Manager

SWEENEY BROTHERS TRACTOR CO.
Fargo, North Dakota
Phone 2-3305

FOR SALE OR LEASE

One Link Belt LS 68 Backhoe Machine, SN 6AB356, a ⅜ Yard Machine powered by GMC 3030C Diesel Engine, has hydraulic controls, 36" cutting width, extra long tracks and 36" pads. Used only on one job. Very good condition.

One 80 HP Cleaver Brooks Steam Generator, Model LFM-8, Skid mounted, excellent condition.

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Line Dept.
P.O. Box 248 First Nat. Bank Bldg.
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All Contractors & Dealers
Large or Small

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Spreads Hot or Cold Mixes, Stone, Slag, Gravel and other road materials 0" to 6" in depth and any width 8' to 12' wide, smooth and even. Easy to adjust, one man can operate. Adjustable hitch; fastens to any regular dump truck, no special hitches needed. Easy to transport; may be transported with any dump truck, loaded or empty. Machine may be adjusted or transported in a few minutes, no extra equipment needed. Machine is adaptable to large or small jobs; State, County, Township, Subdivision roads; Driveways, Parking Areas. Save time, labor and material.

Warren Manufacturing Company
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FINISHER—BLAW KNOX

1—Model XC Transverse Finisher, size 10' to 15', new 1946, completely overhauled 1955 and not used since.
F.O.B. Fultonville, N.Y. $3,900.00

CAT HYD. LOADER

1—Model HT4 with one yd. Loader, new 1948, very good condition 6,900.00

SCOOPMOBILE

1—Model DS-1, one yd. size, new 1949, good operating condition 2,500.00

R. B. WING & SON
Phone 3-4161 Albany, N.Y.

FOR SALE
International TD-24 with Dble. Drum Central Unit & Angle Bulldozer
Excellent Condition
SWEENEY BROTHERS TRACTOR CO.
Fargo, North Dakota

FOR SALE OR RENT

New Model 3—100 American Steel Erectors

Guy Derrick—100' Boom, 110' Mast,

complete without running cable and hoist.

THE HUNTER CONSTRUCTION CO.
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Telephone - East CHicago 5002

ASPHALT FINISHER

Adnun Asphalt Paver that is in top condition, can be used for laying asphalt or for laying base rock. This machine gives an initial rolling process to base rock that saves 50% of your moisture.

BARGAIN - $3,250.00

AUSTIN GREENE & ASSOCIATES
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FOR SALE

Complete Cedarapids Asphalt Plant, w. 2000# Pugmill, electric powered, w. Dryer, Dust Collector, oil-fired steam boiler.

2—8,000 gallon asphalt tanks.

Littleford Spraymaster Asphalt Distributor, 1970 gal. cap., no. 1 condition.

CENTRAL ASPHALT, INC.
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LATE MODELS MIDWEST LOCATIONS

Manitowoc 3000-B's, 3500's erect cranes — shovels, long booms, wide long cats diesels. Also 2000-B's.
Northwest 6's, 80-D's, and 95 cranes — drags — shovels, diesels, wide long cats — long booms. Ind. BH's.
Bucyrus-Erie 38-B's, 51-B's, 54-B's, cranes — drags, shovels, diesels, wide long cats — long booms.
Marion, Koehring, Link Belt & Lorain model cranes — drags — shovels, wide long cats — diesels. Also backhoe equipped machines, all types.

JAMES C. FRENCH
226 Berry Pkwy. - Talcott 3-4827
PARK RIDGE, ILLINOIS

FOR SALE

#8 Ind. Brown Hoist Locomotive Crane.
MC414 SP Wagon Crane.
MC414, 416 Truck Crane.
Late No. 6 NW Backhoe.
Backhoe attachment for NW25, 80D.
Backhoe att. Lorain 77, 40, 41.
1½ yd. Page RC Drag Bucket, 90% new.
15 cu. ft. Orange Peel Bucket.
Cat. 60, 70, 80 scraper
New GM 6-278 Marine Diesel engine
Bargain, equipped w/300 KW Diesel Generator

ROCKY RIVER EQUIPMENT & SUPPLY CO.
Cleveland 16, Ohio
EDison 1-1010

FOR SALE OR RENT

3—Allis-Chalmers TS-200 13 yd. Motor Scrapers. New—1955.
3—Allis-Chalmers TS-200 13 yd. Motor Scrapers. New—1956.
3—Allis-Chalmers Model 360 13 yd. Motor Scrapers. New—1956.
3—Allis-Chalmers HD-21 Bulldozers. New—1956.
1—Allis-Chalmers HD-16 Bulldozer. New—1956.

These machines are priced for quick sale, and are in the Binghamton area.

SERAFINI CONSTRUCTION CO., INC.
Binghamton, N. Y. Phone 4-2385

LIQUIDATION!

. . . PIPE LINE SERVICE . . .

1—TD14 IHC Side Boom.
2—TD14 IHC Combination Side Boom and Back Filler Blades.
1—D6 Cat, Wide Tread, C C Dozer with Extra Angle Blade.
2—Cleveland Ditchers, Model 140.
1—Buntam Truck Mounted Back Hoe.
3—Int. Truck Tractors and Floats.
3—Bob-tailed Trucks.
2—1½-ton Trucks with Welding Machines and Acetylene Equipment.
3—Chevy ¾-ton Pickups.
All Necessary Small equipment for Pipe Line Spread

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2—3 Yd. Yeager Truck Mixers. Each @ .....$	600.00
1—3 Yd. Smith Truck Mixer ...	550.00
2—Single Axle Low-Boy Trailers, ea @	850.00
1—30 Ton Tandem w/Removable gooseneck	4,000.00
1—Buckeye "301" Farm Ditcher	3,500.00
1—Badger Ladder Type Ditcher	2,750.00

JORDAN EQUIPMENT CO.
719 North Wilber St. - CEntral 4-3988
South Bend 28, Indiana

FOR SALE

One Allis-Chalmers H.D. 15 G.C. 3 Yard Payloader, bought Dec. 1955 used 9 months. Like new, all New Rollers, Hydraulic Pump, Front Idlers, Cats, etc., just replaced today's new cost $34,000.00. Our special price $16,500.00

Also 2—1949 Sterling Dump trucks, 10 yds., 3 axles, good rubber, Cummins diesels, good condition at 3450.00 each. Also one Auto-Car tractor with 25 ton Low Boy Trailer, Navy Surplus, 1949, good condition, $1950.00

Perma
646 Lorimer St., Brooklyn, N.Y.

DEPENDABLE USED MACHINES
Agricat with rubber track pads
Vermeer Model 24T trencher
Lessman 10-HF ¾ yd. loader
20 H.P. American car puller
Bucyrus-Erie H-3 hydro crane
12 T. Bay City skeleton trailer
TRACTOR & EQUIPMENT CO.
10032 Southwest Highway, Oak Lawn, Ill.

ROGERS Portable 2-Unit Crushing Plant w/24x36 rb. Jaw, apron feeder, conveyor, diesel power. 36x24 rb. double roll. 4x12 5½-deck screen. 4 delivery conveyors, all mounted tandem rubber. New May 1955, excellent. Cost $75,000. Sell $45,000. Rent $1500/mo. apply purchase price.
SIMPLICITY 4x8 3-deck hvy. duty D Vibr. Screen. Excellent. $1650 Yard.
BUCYRUS-ERIE 22B Dragline #22859, w/GMC diesel, rebuilt, excellent. $10,500 Rental Purchase. Yard.
OSGOOD 15 ton Motorcrane, tandem drive, 1000x20 tires, outriggers, 55' boom, rebuilt. $7000 Rental Purchase. Yard.
UNIT 1020 Combination Shovel & Backhoe, GMC diesel, new 1948. Good condition. $5250 Rental Purchase.
INSLEY K14 Dragline, #2193, long crawlers, 40' boom, Waukesha gas. ¾ cy. Good. $4000 Yard. Rental Purchase.
LINK BELT LS40 Shovel, good condition. $3500 Yard. Rental Purchase.
P&H 255A Shovel Attachment, new. $1350 Yard.
BACKHOE ATTACHMENT for P&H 655, complete 1½ cy., new. $3500 Yard.
CATERPILLAR 80 Scraper, #3D2000. 2400x29 tires, 90% condition throughout. $7500 Yard. Rental Purchase.
LAPLANTE CHOATE C84 Scraper, 12-15 cy., 1800x24 tires. Good. $2500 Yard. Rental Purchase.
LETOURNEAU D Roadster w/Cummins diesel, Good rubber, rebuilt. $6000 Yard. Rental Purchase.
INGERSOLL-RAND 600 cfm. Rotary Portable Air Compressor, new 1955, rebuilt. $7000 Yard. Rental Purchase.
GALION—3-5 ton Tandem Roller, like new. $2500 Yard. Rental Purchase.
CLEAVER BROOKS 2-Tank Car Portable Asphalt Heater, good. $750 Yard.
HUBER 10-ton 3-wheel Roller, hyd. steering, excellent. $2250 Yard.

Wenzel Mach'y Rental & Sales Co.
565 S. 10th — Mayfair 1-1710
Kansas City, Kansas

FOR SALE
D8 Hyster Winch, also
Two only LaPlante-Choate Bulldozer Assemblies complete with controls to fit Caterpillar D6 wide gauge.
Contact: Allatt Tractor Parts Co.,
930 Millwood Road,
TORONTO, Ontario

Manufacturers' Literature

Stacor-Matic Drafting Unit

A new drafting unit that provides a complete working station for engineers and draftsmen is described in a bulletin issued by Stacor Equipment Co., 768-788 E. New York Ave., Brooklyn 3, N. Y. The unit consists of an adjustable drafting table for one man and a reference area for the next in line. The bulletin shows how much space is saved by this combined unit, the time and steps saved in having material at each man's fingertips, and natural fatigue avoided by the convenience and mobility of the unit.

For more details circle 151 on Enclosed Return Postal Card.

Extra-Strength Clay Pipe

A 4-page technical bulletin, "Extra Strength Clay Pipe," has been prepared by Clay Pipe Association, Inc., 311 High-Long Building, 53 E. Long St., Columbus 15, Ohio. The bulletin illustrates pipe trenching conditions which require extra-strength and standard-strength clay pipe. The tables give supporting strengths in pounds per lineal foot for pipe sizes from 6 to 36 in. and for varying bedding conditions. The bulletin also lists crushing strength requirements for extra-strength clay pipe and schedules of dimensions for full-diameter and reduced-diameter extra-strength pipe.

For more details circle 152 on Enclosed Return Postal Card.

Bridge Concreting Solutions

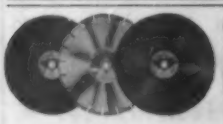
Bridge concreting, its problems and solutions is the theme of a 16-page reporter (MBR-P-11) available from William T. Kennedy, Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio. Case histories of some 280 bridges are covered in five stories illustrated by photographs. The stories were selected to be representative of the great variety of job and weather conditions common to bridge construction. This reporter cites the vital role played by Pozzolith as a means of controlling concrete quality under a wide variety of weather and placing conditions.

For more details circle 155 on Enclosed Return Postal Card.

Salem Lists Auger Drill Parts

A new parts bulletin No. 11156, issued by The Salem Tool Co., Salem, Ohio, lists drilling augers, heads, bits and other accessory parts for the firm's line of McCarthy coal recovery, horizontal and vertical auger drills. Various size attachments equip the McCarthy drills to bore holes from 3 in. to 48 in.

For more details circle 156 on Enclosed Return Postal Card.

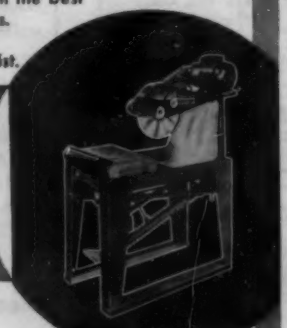


Save 50% or More on Concrete Cutting Costs

with *Cardinal* ABRASIVE or DIAMOND BLADES

This is a promise, not a rumor! CARDINAL makes ABRASIVE CONCRETE CUTTING BLADES that are break and wear resistant . . . that actually outperform the best of the standard diamond blades, at a fraction of the cost!
And CARDINAL also makes CONCRETE CUTTING DIAMOND BLADES with "king size" segments, maximum diamond concentration, and hi-retention TUNGSTEN CARBIDE bond—that will outdistance and outperform the best of the conventional diamond blades.
Between the two there's savings for you! Request folder and price list.

Cardinal "Super-Powered" MASONRY SAWS
14" and 18"—with Micrometric Adjustments—Blade Saver—Quick Voltage Changeover. Amazing LOW PRICE!



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WORLD'S LARGEST MANUFACTURERS OF ABRASIVE AND DIAMOND MASONRY BLADES AND SAWS • DISTRIBUTORS IN PRINCIPAL CITIES

For more details circle 253 on enclosed return postal card

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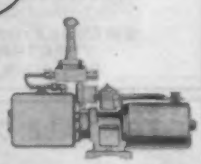
MONARCH Controls Your Plow
. . . automatically!

JEEPS — TRUCKS

POWER — MONARCH HYDRAULIC — CONTROL

Snow removal is fast, dependable and safe with Monarch Power Hydraulic Control Equipment . . . cab-controlled for one-man instant action, the Monarch zips snow plows into operation with ease and speed. Fan-belt driven or Electric models are available for practically all makes of vehicles. Proven in service everywhere, over 50,000 Monarch Controls have been sold. See your dealer or write for full details.



The Monarch DYNA-MIGHT Model HEP (as illustrated) combines all parts in one package for ready installation on new or existing equipment.

MONARCH
ROAD MACHINERY COMPANY
1331 MICHIGAN STREET, N.E., GRAND RAPIDS 3, MICHIGAN

For more details circle 377 on enclosed return postal card

WHEN THAT METAL CUTTING JOB IS REALLY

TOUGH!

Make it EASY!
(and cut costs)
with this . . .
RUGGED POWERFUL

HKP
PORTER
HEAVY DUTY
CUTTER

IT CUTS THESE TOUGH METALS EASILY!

— HARD METALS — CONCRETE REINFORCING RODS — HARD WIRE ROPE — CHROME BALL WIRE — COLD DRAWN ALLOY STEEL — TEMPERED STEEL WIRE

Why fool around with other tools, when the job calls for a PORTER HEAVY DUTY METAL CUTTER? Let those heat-treated, drop-forged, abuse-resistant jaws make the work easy, and less costly. Handles on 590HD size are all steel. This rugged, multi-job tool is designed for cutting the hardest bolts, rods and hard cable. Nothing better for construction companies and heavy industries.

for CUTTING STEEL CABLE and WIRE ROPE use the STEEL CABLE CUTTER

The jaws in this shear-action, clean cutting STEEL CABLE CUTTER are notched to lock the cable in during cutting action to minimize crushing. For cutting soft or hard steel cable or wire rope up to ⅜".

for CUTTING CHAIN use the HARD CHAIN CUTTER — 590HC

The right way to "cut" hard chain, alloy and case-hardened tempered spring wire and case-hardened bolts and screws is to crush (not cut) them with the center cut, round edge action of this PORTER HARD CHAIN CUTTER. Cuts one side of link at a time to prevent damage to tool. Capacities up to ½".

WRITE for catalog showing these and other PORTER METAL CUTTING TOOLS.

HKP
H. K. PORTER, Inc.
Somerville 43, Mass.

Clark Catalog Describes Line

The complete line of fork-lift trucks, straddle carriers, powered hand trucks and towing tractors produced by the Industrial Truck division, Clark Equipment Co., Battle Creek, Mich., is described in a new 16-page 4 color catalog, published by the company. Each machine is illustrated.

For more details circle 157 on Enclosed Return Postal Card.

Paving Asphalts and Emulsions

A new 8 page, full-color booklet has been issued by the American Bitumuls & Asphalt Co., 200 Bush St., San Francisco 11, Calif., describes its nationwide production and distribution facilities for all types of emulsified asphalts for the construction industry. These include bitumuls emulsified asphalts, plus Laykold asphalt specialty products. Testing and research operations plus technical field services are highlighted and illustrated in the booklet.

For more details circle 158 on Enclosed Return Postal Card.

Predraining Excavations

A new catalog issued by the American Dewatering Corp., 140 Cedar St., New York 6, N. Y., sets forth the advantage of contract predraining of excavations. The catalog is illustrated with photographs of jobs of various types.

For more details circle 159 on Enclosed Return Postal Card.

Roadside Weed, Brush Control

A new catalog (No. 5-64) available from H. S. Watson Co., 1316-67th St., Oakland 6, Calif., describes how a pick-up truck can be quickly and simply adapted to roadside weed and brush control. The spray rig pump is power take-off operated, and the catalog shows how jets can be mounted so that one man drive-spraying is possible with cab control. Hand gun spraying is also shown. The mounting of this spray rig in no way changes the basic use and appearance of the pickup, it is said.

For more details circle 160 on Enclosed Return Postal Card.

Bituminous Application Guide

Littleford Bros., Inc., 457 E. Pearl St., Cincinnati 2, Ohio, has announced a new bituminous application guide (Shot Guide) that is designed to be a quick reference in determining the correct speed of a bituminous distributor when applying a pre-determined amount of bituminous material to a road surface. Other information includes: a conversion chart for trucks not equipped with fifth wheel tachometer, speed is broken down from miles per hour to feet per minute; a chart on heat conversion; application and uses of various grades of tar, asphalt and emulsion; and a guide for finding the correct touch speed.

For more details circle 161 on Enclosed Return Postal Card.

REDUCE BRUSH CLEARANCE COSTS . . . MECHANIZE WITH PORTABLE, POWERFUL

ROWCO
BRUSHKING

Rowco Mfg. Co., Inc., 82 Emerald St., Keene, N. H.

Subsidiary of Harrington & Richardson, Inc.— Est. 1871 In Canada: H and R Arms Co., Ltd., Montreal 23, P. Q.

Please rush me illustrated literature on Brushking

Name_____

Street_____

City & State_____

Clears all brush, grass and weeds!

Easy does it . . . when your crew is working with amazing BRUSHKING! Clears all brush and grass . . . even small trees. Goes anywhere, reaches down gullies, ditches; cuts close to fences, rocks, posts. Will cut costs 80% by replacing the use of scythes, axes, brush hooks. Rugged, dependable, fully guaranteed. Absolutely safe and easy to operate . . . Thousands in use throughout the world.

Write for full details

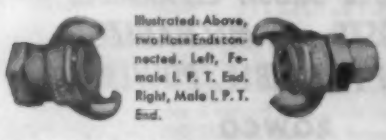
. . . for more details circle 330 on enclosed return postal card

. . . for more details circle 336 on enclosed return postal card

"AIR KING"
Quick-Acting, Universal
HOSE COUPLING

FOR COMPRESSORS, ALL TYPES OF AIR TOOLS, WATER, OIL AND SPRAY SERVICE

This versatile coupling is built along plain, rugged lines to assure long, trouble-free service under severest working conditions.



Illustrated: Above, two Hose Ends connected. Left, Female I. P. T. End. Right, Male I. P. T. End.

The "Air King" will reduce operating costs wherever quick connections are required. Locking heads are identical for all sizes of hose or threaded ends, permitting the coupling of any two sizes of hose within the "Air King" hose end size range, or coupling to any pipe up to 1" by use of the male or female threaded ends. Heads are locked by pressing together and applying a quarter-turn. A patented Safety Locking Device eliminates all risk of the coupling coming apart. Available in bronze or rustproofed malleable iron, in sizes up to 1".

The "Air King" is made to established standards for couplings of this type and is interchangeable with other similar makes.

Also available in 4-Lug style, Hose and Female I.P.T. Ends only, in 1¼", 1½" and 2" sizes.

DIXON
Valve & Coupling Co.
EXPORT DEPARTMENT
1010 SCHAFF BLDG.
PHILADELPHIA 2, PA., U.S.A.

. . . for more details circle 274 on enclosed return postal card

With the Manufacturers and Distributors

THE MCDONALD EQUIPMENT CO., P. O. Box 2516, Little Rock, Ark., has been appointed as a construction distributor in Arkansas by the Kwik-Mix Co., Port Washington, Wisc. The Parsons Co., Newton, Iowa, and C. S. Johnson Co., Champaign, Ill., have also selected McDonald Co. to handle sales and service of their products in Arkansas. Kwik-Mix, Johnson and Parsons are affiliates of Koehring Co., Milwaukee, Wis.

HARNISCHFEGER CORPORATION, Milwaukee, Wis., has appointed Paul Jacobson excavator salesman for the Philadelphia, Pa., office. He will work out of the Washington, D. C., office handling sales of all construction and mining division products to both the commercial markets and federal agencies. Mr. Jacobson was public works officer and resident officer in charge of construction for the Charleston, S. C., Naval depot prior to joining Harnischfeger in 1955.

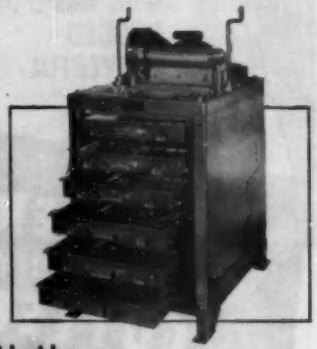
THE EARLE EQUIPMENT CO., 6331 Fireman Ave., Detroit, Mich., and Marks Tractor and Equipment Co., 4300 Brookpark Rd., Cleveland, Ohio, have been appointed distributors for Buffalo-Springfield road rollers and compaction equipment.

THE ACTION EQUIPMENT CO., 2915 E. Miner Ave., Stockton, Calif., has been appointed to handle sales and service of products by Koehring, Parsons and Kwik-Mix, all divisions of Koehring Co.

GRADALL DIVISION, The Warner & Swasey Co., Cleveland, Ohio, has appointed the following new distributors: Contractors Equipment and Supply Co., of Albuquerque, N. Mex., for the state of New Mexico; Fehrs Tractor and Equipment Co., 1809 Cumings St., Omaha, Neb., in the state of Nebraska and the western section of Iowa west of and including the counties of Dickinson, Clay, Buena Vista, Sac, Crawford, Shelby, Cass, Montgomery and Page; Construction Equipment Co., Ltd., 33 W. Third St., Vancouver, B.C., which now handles Gradall in Alberta and Saskatchewan provinces, takes on the new territory of British Columbia and the Yukon. In the territory of Hawaii, Gradall will be represented by U.S.I. International, division of the U.S. Industries, Inc., P. O. Box 300, Honolulu.

THE PACIFIC BUILDERS SUPPLY CO., 400 N. Thompson St., Portland, Ore., has been appointed a construction distributor by Kwik-Mix Co., Port Washington, Wisc., a sub-division of Koehring Co., Milwaukee, Wisc.

CONTROL SIZING FAST, ACCURATELY AT THE JOB SITE



with the
GILSON
TESTING SCREEN

Be sure of accurate size-control of road aggregates—by the method the entire industry respects: GILSON Screen Testing.

Operating at the job site or field lab, the GILSON Screen takes a cubic-foot sample of coarse aggregate, makes two to seven separations simultaneously, in five minutes or less per complete test. The GILSON Mechanical Testing Screen is built for rough use, requires practically no maintenance, is moderate in cost.

A sand attachment is available for handling 8-inch sieves.

THE GILSON TESTING SCREEN IS THE STANDARD SIZING CONTROL OF THE INDUSTRY.

Write for full information, or call Malinta 592.

GILSON SCREEN CO.
MALINTA OHIO

. . . for more details circle 293 on enclosed return postal card

JOHN J. KLOSKOSKI has been appointed general service manager for Davey Compressor Co., Kent, Ohio.

POWER EQUIPMENT CO., Knoxville, Tenn., has been appointed distributor for eastern Tennessee for Fairfield Engineering Co., Marion, Ohio.

ABEL A. MEDLIN, formerly with International Harvester Co. for 16 years, has returned to that firm after four years with Dodge division Chrysler Corp. He will serve as supervisor of the newly created used equipment merchandising department of the Construction Equipment division.

H. V. HIATT has been appointed assistant to Roy C. Gaddis, president of Highway Equipment Co., Inc., Cedar Rapids, Iowa. R. H. Krimlofski has been appointed assistant sales manager.

HARRY M. THOMPSON has been appointed supervisor, product information and sales training, for the Industrial division of the J. I. Case Co., Racine, Wis.

R. MERRICK has been named a sales engineer with the Construction Equipment division of Blaw-Knox Co., Pittsburgh, Pa. Mr. Merrick has been assigned to the Chicago office of the Pittsburgh company whose construction equipment plant is located at Mattoon, Ill.

G-K MACHINERY CO. 5200 Federal Way, Boise, Idaho, has been appointed distributor for the complete line of Le Tourneau—Westinghouse Co. and Adams products in southern Idaho and eastern Oregon.

KOLBE BROS. EQUIPMENT CO., INC., 5686 N. Teutonia, Milwaukee, Wis., has been appointed distributor for Buffalo-Springfield road rollers and compaction equipment.

It's New! The YOUNG CURBING MACHINE

6,000 pound positive extrusion force eliminates clogging

Lays up to 150 feet of 6" asphalt curb per hour

A hydraulically powered positive ram forces the hot-mix asphaltic material out of the machine in a perfectly formed curb with such high density that no packing is needed. Easily changed forms up to 12" high and 24" wide may be used. Eliminates building conventional curb forms. May also be used for special mixes of Portland cement.

For paving, the Young Model 109 Asphalt SPREADER with Double-Action Screed takes the guess work out of radius and angle paving.

Write today for complete information and prices

The YOUNG CO. Box 425 WACO, TEXAS

. . . for more details circle 374 on enclosed return postal card

WHAT ABOUT YOU, MR. READER?

Are you still active in the field? Have you moved or changed your position?
Unless you send this information directly to us we can't be sure. Sometimes a reader's name is cut from the mailing list because we are not sure that our information as to name, title and address is right. *Your* name might be cut from the mailing list.

Don't Let This Happen to You

Even if you think we know all about you, please fill in the information requested below and send to us by return mail. Our auditors require proof of accuracy of our mailing list. *You* are the only person who can help us on this. Do it now before you forget, so you can be sure your magazine will always be properly addressed to you. New names cannot be added or old names retained on our list unless we have *all* this information. *Please print or type.*

ROADS AND STREETS DATE _____

22 WEST MAPLE STREET, CHICAGO 10, ILL.

☐ I do receive ROADS & STREETS and wish to continue to receive it.
☐ I do not receive ROADS & STREETS but would like to have it.

NAME _____

TITLE OR OCCUPATION _____

FIRM NAME OR GOVERNMENT DEPARTMENT (give street address) _____

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CITY _____ ZONE (if any) _____ STATE _____

(If you have moved give *old and new* address)

SIGNATURE _____

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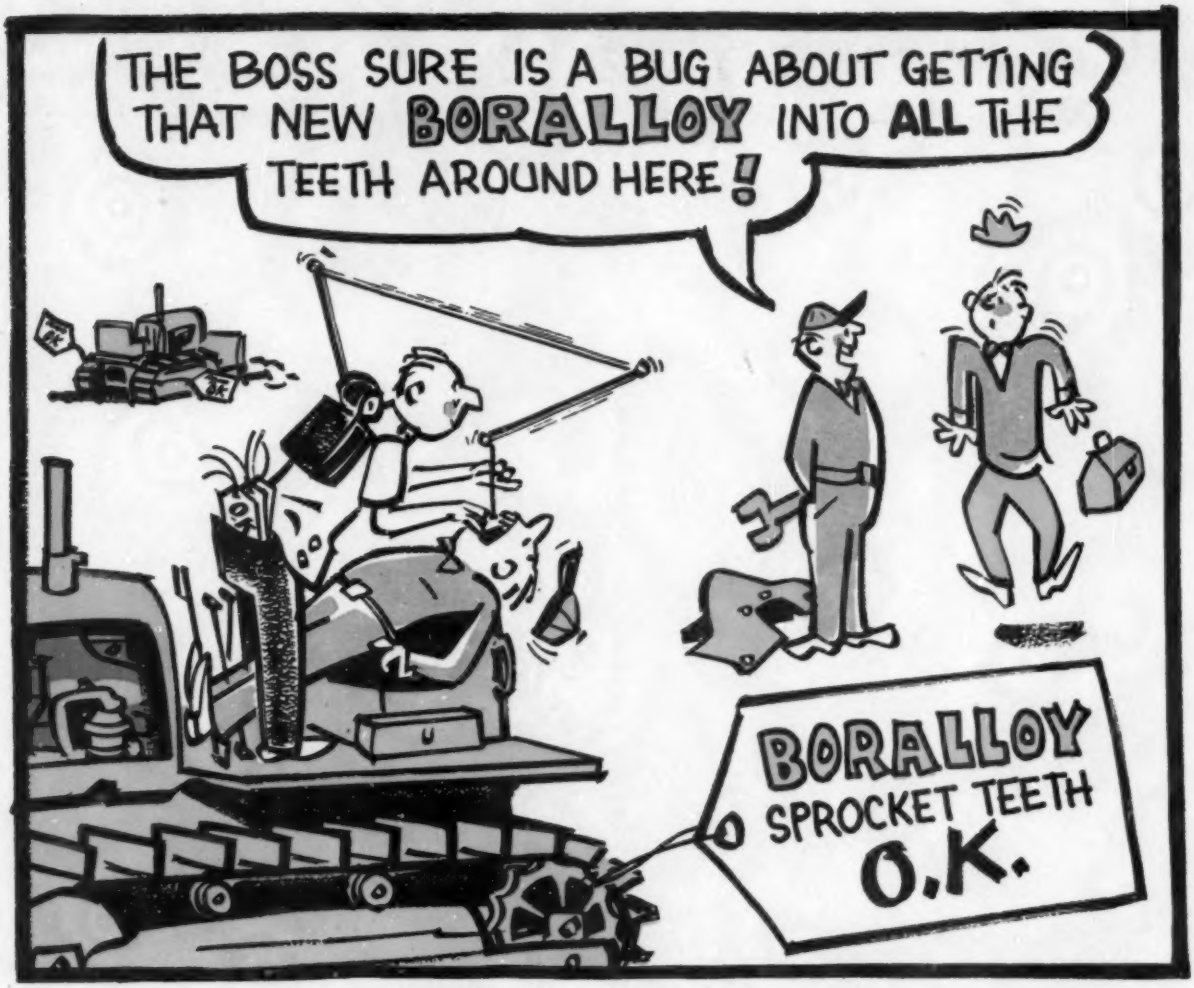

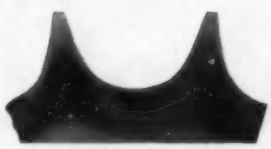

It increases sprocket life 50 to 100%! Got the name?—*Boralloy*. It's a new alloy which Caterpillar uses to make sprockets and replacement rims. It permits a minimum of 61% deeper hardening.

Result: CAT* BORALLOY sprocket teeth hold their contour longer. Teeth and track bushings *stay* in proper mesh, reducing wear and tear on all track running gear. Don't take chances. Get parts you can trust—see your Caterpillar Dealer today! Where else can you get the long-life benefits of Boralloy?

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

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Answer to a paving problem at Houston International Airport

Photographs

(left) Laying initial course of 1-inch Texaco Sheet Asphalt on instrument runway of Houston International Airport.

(center) Rubber-tired and tandem rollers were used to compact Sheet Asphalt course.

(bottom) Constructing 3-inch coarse-graded Texaco Asphaltic Concrete binder course.

One of the nation's busiest air fields, Houston International Airport was confronted with the deterioration of 155,000 square yards of rigid type pavement on runways and taxiways. How to provide this large area with durable, economical paving, while subjecting plane traffic to a minimum of inconvenience, was the problem.

The answer was the construction of a heavy-duty plant-mixed Texaco Asphalt pavement in three courses over the defective runways and taxiways. Approximately 50,000 tons of asphalt mix was laid to a thickness of 5¼ inches. One inch of fine aggregate Texaco Sheet Asphalt was laid first, partially filling cracks and leveling the old pavement. This was followed by 3 inches of coarse-graded Texaco Asphaltic Concrete and a 1¼ inch wearing surface of dense-graded Texaco Asphaltic Concrete.

Houston International Airport's Texaco-paved runways and taxiways combine rugged durability under heaviest air field traffic with a high degree of skid-resistance. Both initial cost and upkeep cost are lower than for comparable rigid paving. Snow melts more rapidly on a dark asphalt surface, an important advantage in many parts of the country.

Whether you are paving an airport, highway, street or parking area, there is a heavy-duty, intermediate or low-cost type of Asphalt construction to fit your requirements. Helpful information on all types is supplied in two free Texaco booklets which our nearest office will be glad to send you.

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